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Slight Improvement Noted

In demand for some products, but positive developments are lacking

Like a timid flower breaking through the snow, some new business is appearing and is giving slight encouragement, but developments are not important enough to justify any definite opinions as to whether general conditions are likely to improve. While pig iron prices are being well maintained by nearly all northern makers, quotations on finished materials vary greatly and mill activities are being curtailed. It is expected that the unfilled tonnage statement of the Steel Corporation for March will show a loss of more than 300,000. Its operations are now about 72 per cent of capacity.

Pig Iron Production

Although buying of pig iron has been very limited for a number of weeks, the production continues heavy and there is positive evidence that the iron is being used. When consumption is at such a heavy rate, the conditions of the country cannot be as bad as some facts would seem to indicate. The production of coke and anthracite pig iron for March was 2,341,551, a gain of 452,944 tons over February. The daily average output was 75,534 tons in March, and 67,450 tons in February. The gain was due largely to the blast furnaces of steel works. There were 232 active furnaces on the last day of March, a gain of 13 during the month.

Railroad Buying

The action of the president of the New York Central line in notifying the mayor of Cleveland that the Lake Shore and the Pennsylvania railroads were ready to sign an agreement with the city to build a $17,000,000 depot, but that the beginning of construction could not be expected under present financial conditions, illustrates the extreme conservatism of the railroads at the present time. There is some improvement in new orders and inquiries for cars, as the Southern Pacific is inquiring for 5,100 cars and other inquiries pending call for about 10,000 cars. The Pennsylvania railroad has awarded 5,000 tons of 120-pound open-hearth rails each to the Pennsylvania Steel Co. and the Cambria Steel Co., which are to be rolled according to new specifications to determine cost. The railroad has also ordered the same tonnage to be rolled under the old specifications. The feeling that there will be considerable buying of equipment if the Interstate Commerce Commission grants the increase in freight rates to the eastern railroads is growing stronger.

Cast Iron Pipe

The United States Cast Iron Pipe & Foundry Co. has taken orders for 7,600 tons of pipe for Cleveland, 1,500 tons for Springfield, Mass., and is the low bidder on 2,100 tons at Cincinnati. The pipe line at Highland Park, Mich., for which either wood or iron may be used, will be let within a few days and will require 13,000 tons of cast iron pipe if the use of iron is decided upon.

Plates and Shapes

The capacity of plate and shape mills in operation in Western Pennsylvania has recently decreased 8 or 10 per cent. The capacity in operation is now about 66 per cent, while new orders have been at the rate of only about 33 per cent. There is a large prospective tonnage of structural material in eastern territory and in northern Ohio there are a number of bridge and other projects calling for a fair tonnage, but there is no improvement in bookings. In eastern territory, plates and shapes are now easily obtainable on a basis of 1.15c, Pittsburgh, and even 1.10c has been done on plates.

THE OPEN HEARTH

Better Days Coming

IN accounting for the prevailing depressioin in the iroin trade, it is usually stated that the limited buying of the railroads is the most important factor. Perhaps this is true, but the attitude of the farmer in not buying farm implements as freely as he usually does is also a highly important factor. An industry representing an investment of forty billion dollars in lands, buildings, fencings, etc., and six billion dollars in tools and live stock, as estimated by C. W. Burkett, editor of the *American Agriculturist*, is of tremendous importance to every industry in the country. Hence THE IRON TRADE REVIEW, in order to ascertain why the farmer is not buying, sought information from well-informed editors of agricultural journals who are closely in touch with the farmers of the country. Certain specific questions were asked these editors, in a suggestive way merely, and they were invited to give their views. The result, as indicated by four letters published in this issue of THE IRON TRADE REVIEW is highly interesting. We commend these letters to the careful perusal of our readers.

Perhaps the most interesting feature of these letters is found in the statement of several of the editors that farmers are compelled to buy fewer implements because they have been taught efficiency and are taking better care of their property; in other words, the farmer is a better business man. Many other important points are developed.

The fault at the present time is not, however, entirely with the farmer. There is positive evidence of over-production of farm implements. This, with the financial difficulties encountered in connection with notes given for farm implements, has added greatly to the unsatisfactory conditions.

Throughout the letters, however, there is a distinct note of optimism. Whether for a good cause or not, the farmer has reduced his buying, better days are coming.

Developments following the petition of eastern railroads for permission to increase rates indicate there is more in railroad charges than was dreamed in the philosophy of most shippers.

Real Government Aids

MANUFACTURERS whose business takes them into the export field are paying due homage to the efforts of the consular service of the United States to render a commercial, as well as a diplomatic aid to the citizens and to the invested enterprise of this country. This body of vigilant, though underpaid Americans, is showing commendable zeal in putting the business interests of this country in touch with trade opportunities in all sections of the globe through systematic communications to the department of commerce and labor and through original efforts.

American business is profiting in an important measure from this energy. The successful competition recently of a Philadelphia maker for a large cast iron pipe contract in Italy greatly was furthered by the co-operation and help of the local consul. President James A. Farrell, of the United States Steel Corporation, whose wide knowledge of export business conditions is recognized generally, expresses his high approval of the policy of the secretary of commerce to supplement and improve the consular service by the appointment of a number of commercial attaches in the principal capitols of the world. Mr. Farrell pays this tribute to the men who are enlisting themselves to further American commercial prestige in every section of the globe:

"Our consular service has reached a remarkably high state of efficiency in co-operating with the American manufacturers and producers who are interested in securing markets for their products and thereby extending and developing the peaceful commercial relations and prosperity of our country."

The work of the consular service is one of the hopeful signs of the willingness of the government to co-operate with American manufacturers to extend their foreign trade and to place them more nearly on an equality with their competitors abroad, particularly in Germany, who enjoy especial favors from their governments. May the development of this policy continue to demonstrate that the government ought to be the ally, not the foe, of business and that every dollar of foreign trade

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gained by American producers is a contribution by that much to the peace and prosperity of the whole people.

People, Facts and Business

THE recent address of President Willard, of the Baltimore & Ohio railroad, at the dinner of the Traffic Club in Pittsburgh, was an admirable example of how the problems affecting the railroads of the country are being discussed on a very high plane. In spite of the fact that the railroads have suffered so severely from agitation during the past two years, there was not the slightest tinge of bitterness in President Willard's address. He contented himself by presenting his facts and making his argument without questioning the motive of anybody. He freely admitted that in the light of present day standards the railroads in past years have done things which they ought not to have done, but he wasted no time in pleading extenuating circumstances. He went straight forward to consider the situation as it exists today. He refuted the claim frequently made that the capitalization outstanding against American railroads is much in excess of their valuation and pointed to the fact that the outstanding capitalization of the entire American railway system was $63,949 per mile in 1911, as compared with $275,354 per mile in the United Kingdom, $143,648 per mile in France, $117,837 per mile in Austria and $113,326 per mile in Germany. Many other important facts were cited.

On one point we believe that President Willard is absolutely right; and that is, as to the present attitude of the press toward the railroads. President Willard said that four years ago, when the eastern carriers endeavored to advance freight rates, the press was generally opposed to the movement. Today it is practically unanimous in support of the railroads' position. He said that he believed that this change had been brought about by the efforts which have been confined to the very simple procedure of presenting the facts. In other words, the railroads have learned that in order to have the American people on their side, the railroads must be in the right and the people must understand the facts. So it is with business in general. The more the people of the country understand the facts, the more friendly they will be to all honest business.

Safeguarding the Human Factor

HEREAFTER all promotions of whatever character will be made only from the rank of those who do not indulge in the use of intoxicating drinks. The heads of departments and the foremen will be expected to enforce this order in advancing their men."

This official order recently posted in the mills of the Carnegie Steel Co. in the Youngstown district, is in line with the elaborate system of that company to maintain the efficiency and safety of the men of its mills.

It illustrates the effort of large employers to reduce the fallibility of the human element in industrial accidents. An unsteady hand or a confused brain, where alertness is required, may mean the injury not only of the one thus affected, but serious disaster to his fellow workmen as well.

Uniformity Indorsed

THE suggestion made in these columns last week that iron and steel scrap be bought and sold entirely on a gross ton basis and so quoted in trade papers is being heartily commended, especially in centers where both methods of dealing are in vogue. George Bartol, president of the Otis Steel Co., says there is no sound reason for using the net ton in scrap quotations. Secretary Verner, of the Western Scrap Iron and Steel Association, heartily favors adopting the gross ton in the Chicago district. The purchasing agent of one of the largest concerns in the Chicago district, which uses about 100,000 tons of scrap per year in its plants throughout the country, writes strongly endorsing the position of THE IRON TRADE REVIEW. He says in part: "While we have never recognized the net ton basis, still, generally speaking, the uniform use of the gross ton would undoubtedly simplify matters all around and eliminate any misunderstandings as to whether or not purchases were made on a net or gross ton basis."

Prices Present and Past

Quotations on leading products today, average for last month, average for three months ago and average for April, 1913. Prices are those ruling in the largest percentage of sales at the dates named.

	Today's prices.	Average for March, 1914.	Average for Jan., 1914.	Average for April, 1913.
Bessemer pig iron, Pittsburgh..	$14.90	$15.15	$15.00	$17.92
Basic pig iron, Pittsburgh.....	13.90	13.96	13.42	16.77
No. 2 Fdy. pig iron, Pittsburgh	14.15	14.15	13.70	16.71
Northern No. 2 Fdy., Chgo....	14.25	14.25	14.25	17.00
Ferro manganese, Baltimore....	38.00	38.50	36.50	61.75
Lake Superior Charcoal, Chgo..	15.50	15.50	15.50	18.00
Malleable Bessemer, Chicago...	14.25	14.25	14.25	17.15
Southern No. 2, Birmingham...	10.50	10.63	10.50	12.56
Southern Ohio No. 2, Ironton..	13.50	13.25	13.00	15.63
Basic, eastern Pa.....	14.25	14.25	14.00	16.50
No. 2X Virginia furnace.....	12.75	12.75	12.75	15.00
No. 2X Foundry, Philadelphia.	15.00	15.00	14.75	17.50
Bessemer billets, Pbgh. and Ygn.	21.00	21.00	20.00	29.00
Op. h'rth billets, Pbgh. & Yn.	21.00	21.00	20.00	29.50
Bess. sheet bars, Pbgh. and Yn.	22.00	22.00	21.00	29.50
Op. h'th sh. bars, Pbgh. & Yn.	22.00	22.00	20.60	30.00
Steel bars, Pittsburgh.....	1.15	1.20	1.20	1.40
Iron bars, Philadelphia.....	1.22½	1.27½	1.27½	1.67½
Iron bars, Cleveland.....	1.25	1.25	1.30	1.65

	Today's prices.	Average for March, 1914.	Average for Jan., 1914.	Average for April, 1913.
Iron bars, Chgo. mill.....	1.15	1.17½	1.20	1.57½
Beams, Pittsburgh	1.20	1.20	1.20	1.45
Tank plates, Pittsburgh.....	1.15	1.20	1.15	1.45
Sheets, blk., No. 28, Pittsburgh	1.90	1.95	1.86	2.35
Sheets, blue ann., No. 10, Pitts.	1.40	1.40	1.37	1.75
Sheets, galv., No. 28, Pitts....	2.95	2.95	2.86	3.50
Wire nails, Pittsburgh.....	1.60	1.60	1.55	1.76
Connellsville fur. coke, contr...	2.00	2.00	1.85	2.50
Connellsville fdy. coke contr...	2.50	2.00	2.50	3.19
Heavy melting steel, Pittsburgh	12.00	12.25	11.05	14.44
Heavy melting steel, eastern Pa.	11.00	11.00	10.50	13.75
Heavy melting steel, Chgo.....	9.25	10.25	9.70	12.50
Heavy cast, eastern Pa.....	13.00	13.00	12.50	13.25
No. 1 wrought, eastern Pa.....	13.00	14.50	13.50	16.00
No. 1 wrought, Chgo.....	8.50	9.50	9.18	12.25
Rerolling rails, Chgo.....	11.25	11.75	11.50	14.50
Car wheels, Chgo.....	11.00	12.25	11.75	17.00

(For Additional Prices See Page 688.)

Broadening of Pig Iron Market

In eastern districts—Shipments going forward satisfactorily

A modest broadening of the pig iron market in the New York and surrounding districts a week ago has continued. The Malleable Iron Fittings Co., Branford, Conn., has purchased 4,000 tons of malleable from an eastern New York furnace, to be shipped by rail and water during the navigation season. This was the principal sale of the week. The Bridgeport Malleable Iron Co., Bridgeport, Conn., asks 2,000 tons of No. 2X and 100 tons of high silicon iron for shipment over the remainder of the year. Other inquiries still pending include 1,000 tons of high and medium silicon for Elizabeth, N. J.; 1,000 tons of No. 2X for Cartaret, N. J.; 500 tons of No. 2X and No. 2 plain for Elizabethport, N. J.; 350 tons of No. 2X for the Lackawanna railroad, and about 1,000 tons scattering. A tonnage of basic for eastern delivery is being figured quietly. About 5,000 tons of foundry and special iron for export to Europe and Australia, remain open. Consumers are very deliberate in closing inquiries and the absence of sales makes prices indefinite. No. 2X at $14.75 to $14.25, tidewater, well represents the situation, although one quotation lower than the minimum is reported on 3 to 4 per cent silicon. Buffalo iron for Jersey and Pennsylvania points has been offered at $13.50, furnace, for No. 2X. Active shipments by the furnaces in view of the light buying continues the prominent feature of the eastern Pennsylvania market. In March, the stocks of merchant iron with eastern Pennsylvania furnaces were reduced 20 per cent. Orders April 1 were practically the same as the month preceding, indicating new business equaled the shipments. Importation of Canadian iron, under free duty, became a reality when the first cargo of Wabana, Nova Scotia iron, about 3,500 tons, reached Philadelphia, April 6, which is to be applied against recent sales, principally to R. D. Wood & Co., Philadelphia, and the United States Cast Iron Pipe & Foundry Co., for Burlington, N. J. The eastern Pennsylvania market shows little new inquiry and sales are modest, including 1,000 tons of 1.15 silicon iron, second quarter, to the Baldwin Locomotive Works, at $14, delivered; 600 tons of malleable and special basic for April, to the Stanley G. Flagg Mfg. Co., Philadelphia, the former grade to be furnished by a lake maker at $15.50, delivered, and 1,300 tons of foundry grade to the Norfolk & Western railroad, second quarter, for Roanoke, which went to Virginia furnaces, leaving 600 tons of malleable and 300 tons of charcoal still open. A Lansdale, Pa., soil pipe maker took 2,000 tons of forward iron slightly better than forge at $14.25, delivered. The Southern railway bought a small lot of southern iron and pipe makers took some odd tonnages. Some price irregularity is shown, quotations of $14.80, eastern Pennsylvania, or $13, furnace, being offered by a northwestern Pennsylvania maker for No. 2X or higher silicons. Eastern Pennsylvania makers quote this grade from $14.90 to $15.25, delivered. One Virginia maker offers No. 2X at $12.50 or 25 cents under the general price. Basic and low phosphorus remains inactive. The active Alburtis furnace of the Thomas Iron Co. has been blown out.

Very Dull at Pittsburgh

Veteran Pittsburgh and valley pig iron men say they have not experienced as quiet conditions for many years. There is no inquiry, apparently, although some consumers have not fully covered second quarter needs. Quotations have not been tested recently, and, to a considerable extent, are considered nominal. A consumer outside the immediate district has taken 2,000 tons of basic for prompt shipment, from a nearby stack, at what is understood to be an attractive figure. No. 1 stack of the Shenango Furnace Co., at Sharpsville,

(*For complete prices see page* 688)

Pa., on Bessemer, will blow out for repairs the end of the week.

Light Week at Buffalo

The Buffalo furnaces report another exceedingly light week in sales and inquiry. The orders in pig iron for the week did not aggregate more than 2,000 tons, and this was largely charcoal iron from out of the district. The last two weeks have shown less activity for a like period than has been experienced by the producers of the Buffalo territory in the past 15 to 20 years. Everything seems to be waiting for Washington to act on the railroad rate decision and the outcome of the legislation bearing on the operation of big business.

In the face of this situation, there is no disposition on the part of the Buffalo furnaces to alter prices, which remain firm and unchanged, as for several weeks. The producers are booked with orders covering the greater part of their operation for the current quarter and are showing no disposition to take on new business, at present prices for deliveries, after July 1.

Heavy Cleveland Melt

In the Cleveland district, the most favorable conditions are the firmness of prices and the maintenance of the melt. Buyers are, however, not interested in last half requirements. One important company, operating in the Detroit district, last month delivered more iron than it made.

Chicago Pig Iron Steady

No change has taken place in the pig iron situation in Chicago and business continues extremely quiet. With full expectation that prices will be higher for second half and with a large tonnage on the books for first half, makers are resting contentedly, awaiting developments. No weakening of prices has become apparent even in the face of almost an absence of new bookings. In fact, one producer admits he did not book anything during the past week, while others could count the new tonnage on their fingers.

With comparatively small stocks and bookings practically equal to the possible make at present rate of production, producers can offer only the equivalent of their stocks, added to the tonnage which may be deferred to later delivery.

A premium of 50c to 75c above first half quotation is being asked for second half on the few inquiries being made. Makers without exception prefer not to book contracts now beyond July 1, firmly believing prices will be improved by that time.

Foundry No. 2 and malleable are held at $14.25, Chicago furnace. For second half, $14.75 to $15 is asked.

Southern iron continues available at $10.50 in small volume and from that to $11.50, but comparatively small business is being done, sales being confined to hurry-up orders to fill immediate needs.

Few Sales at Cincinnati

The one bright spot in the pig iron market is that shipments on old contracts are going forward in good volume, but these have slowed down slightly during the past few days. Alabama furnaces are piling some iron in their yards, but southern Ohio stacks are shipping out the greater portion of their outputs. Tennessee makers are piling a little iron, but not as much as those in Alabama.

The market is passing through a period of dullness that promises to be unprecedented in its history. Sales and inquiries are extremely few and small in tonnages. Southern iron has grown a little uncertain, but open quotations are from $10.50 to $11, Birmingham basis, for No. 2 foundry for the first half. The majority of furnaces in both states, especially in Alabama, are holding at from $10.75 to $11, Birmingham basis, for the same delivery.

Southern Ohio producers have refused to accept less than $13.50, Ironton, for No. 2 foundry iron for the first half, although they receive offers for fair tonnages at less each day. The asking price for the second half is $14, Ironton.

Sluggish at St. Louis

The pig iron market at St. Louis remains sluggish in the St. Louis territory, with the inquiry for 500 tons of high manganese iron, which has been in the hands of local agents more than a week, still outstanding. One local agent reports a sale of 100 tons of Southern No. 2 for second quarter delivery, this morning. Agents say that so much iron was sold in January and February, when foundrymen thought the price was going higher, that they do not expect any heavy buying for some time. Southern No. 2 is held nominally at $11, Birmingham, but it is not denied that it could be purchased at a lower figure. Northern iron is held at $14.25, Chicago furnace, and $13.50, Ironton.

Coal mined and floated down the Monongahela river in 1913, according to Mine Inspector C. P. Byrne, totaled 6,256,581 net tons. The Vesta Coal Co., a subsidiary of the Jones & Laughlin Steel Co., Pittsburgh, carried the largest tonnage.

(*For complete prices see page* 688)

Billet Advances

Have not been established at Pittsburgh

Although Pittsburgh and Youngstown billet and sheet bar makers advanced quotations $1 a week ago, new prices have not been established, since there has been no buying of consequence. Specifications are not so heavy as they were a month ago. Wire rods and muck bar still are dull.

Taking Full Quotas in East

Active specifications against billet contracts are reported by the Pennsylvania Steel Co., the Alan Wood Iron & Steel Co. and by other eastern Pennsylvania sellers. In most cases, consumers are taking full quotas. One maker reports enough bookings to carry present operations to July 1. There is little new buying, however, and current schedules of $21 to $22, Pittsburgh, or $23.40 to $24.40, Philadelphia, for rolling, and $4 to $5 higher for forging steel are untested.

Light Tonnage at Cincinnati

Billets are quiet and the tonnage booked last week was light, being about equal to that of the week previous. Quotations are stationary at $22, f. o. b. Ashland, Ky.

Warehouse Business Dull

Leading warehouses in the Cleveland district did about as much business in March as in February, but the volume was by no means large. There was some improvement during the last half of the month.

For Cincinnati Buildings

The books of one large local house shows that twisted concrete reinforcing bars sold in excess during March, with iron bars a close second. The market is quiet, and the better demand that was expected from builders with the advent of good weather, has not developed. Sales made during the past few days have been mostly for building materials, orders being mostly for very small lots.

Shading at Philadelphia

Jobbers at Philadelphia continue to quote generally plates, shapes and steel bars at 1.80c, but this level is being shaded $1 or more. Bar iron from store is 1.65c to 1.70c, Philadelphia.

The Chamber of Commerce of New York City, at a meeting April 2, passed a resolution favoring the granting of an increase in freight rates to the railroads.

Sheets Are Less Active

In Pittsburgh district and prices generally are irregular

Demand for steel sheets has not come up to expectations, and many mills in the Pittsburgh district have reduced operations the last 10 days, some in close touch with the situation estimating that sheet mills are not producing more than between 75 to 80 per cent of capacity. Automobile makers and car builders are fairly active in the market, many of them insisting upon immediate deliveries. Prices, especially for delivery to the southwest, are irregular, minimum quotations being shaded in a number of instances.

Tin plate plants throughout the country are operating at practically full capacity, and prospects for a successful year are bright. There has been some new buying, and prices show more regularity.

Not Strong at Cincinnati

The market is quiet and not very strong. One maker reports that last week's business exceeded that of the week previous, but others state that orders received in the past six days have been smaller than usual. Blue annealed sheets, No. 10, are quoted at 1.55c; black sheets, No. 28, at from 2.05c to 2.10c, and galvanized No. 28 at from 3.05c to 3.10c, all Cincinnati basis.

Prices Shaded at Chicago

Chicago makers of sheets continue to hold 1.95c to 2.00c and 2.95c to 3.00c, Pittsburgh, for No. 28 gage black and galvanized, respectively, but these prices are being shaded by some of the smaller producers. Competition from the middle west is keen and at least $1 per ton under the above prices is known to have been done on fairly attractive tonnages. Specifications are being received in fair volume, but mill books are becoming somewhat depleted and makers are uneasy over the probable course of prices when they become hungry for new tonnage.

Cutting at Cleveland

In the Cleveland district, the competition in sheets is very keen, particularly on blue anealed. Mills are disregarding the Pittsburgh base and are naming prices on sheets delivered, which are equivalent to 1.85c, Pittsburgh, on No. 28 black, and 1.35c, Pittsburgh, on blue annealed.

Eastern Mills Running Full

While leading eastern Pennsylvania sheet makers are running full on current new business and some specifications against contracts, they do not feel certain of their ability to maintain this gait, as the market is very narrow. Eastern prices hold at 1.40c to 1.45c, Pittsburgh, or 1.55c to 1.60c, Philadelphia, for No. 10 blue annealed.

The real estate of the Tacony Iron Works, Tacony, Pa., was purchased by sheriff's sale, April 6, by Wm. J. Montgomery for $53,000. The property was offered for sale on a claim of $15,225.

Specifying on Steel Bars

Is fairly satisfactory—Agricultural interests not buying

Some improvement in specifications for iron bars has been noted the past few days at Chicago, but it consists of small tonnages well scattered over a wide territory. Apparently, users have no reserve stock, are buying to serve present needs only and almost all orders are accompanied by request for prompt shipment. Market observers believe that a lower price would not bring out more tonnage than is being asked for at present. Inquiry is somewhat better, but is of the variety described as "browsing", and lacks that note of sincerity that precedes active buying.

Iron bars are quotable at 1.15c to 1.20c, Chicago, mill, but 1.12½c is known to have been done recently. At present levels, mills are not anxious to contract through second quarter. Steel bars are quiet. Business in steel bars is decidedly slow. With railroad and agricultural interests doing almost nothing, it is difficult to arouse enthusiasm among the bar makers. While 1.33c to 1.38c, Chicago, fairly represents the market, that price is so close to cost of production that it would require an unusually attractive tonnage to better them. In the present inactive state of the market no inducement is offered to go lower. Hard steel bars for reinforcing are in somewhat better demand, but some mills in the Chicago district producing this product are operating only about 50 per cent capacity.

Shading at Pittsburgh

Soft steel bars continue to be held at 1.20c by Pittsburgh district makers, although attractive tonnages frequently are selling at 1.15c. Railroads and agricultural implement makers are not figuring in the market to any noticeable extent. Some estimate that the latter will buy very lightly when covering 1914-15 needs. Iron bars, quoted at 1.30c, are dull. Hoops and bands are selling at $1 a ton under the market a few weeks ago.

Inquiry at Cleveland

One Cleveland firm is in the market for 2,500 tons of steel bars. Specifications against bar contracts at Cleveland are coming in more liberally than those for some other products. The automobile business is credited with supplying a large part of this demand. Bar iron is very dull and plants are operating at reduced capacity, if at all.

Weak at Philadelphia

The eastern Pennsylvania bar iron market remains weak and orders are light. Some smaller mills will do 1.15c, mill, or 1.22½c, Philadelphia, and 1.20c, Philadelphia, is reported possible. The larger eastern makers hold for 1.25c, mill.

Common bar iron at New York is selling from 1.25c to 1.30c, delivered, which figures back 1.15c to 1.20c, eastern mill. Orders are running small.

Fair Specifying in East

Consumers of steel bars in eastern Pennsylvania are specifying only in fair volume at 1.20c, Pittsburgh, or 1.35c, Philadelphia, against contracts. Little is heard of prices below 1.20c, Pittsburgh. New business is small. Rochester, N. Y., asks 800 tons of reinforcing bars and the 1,300 tons for the department of the interior will close April 15.

Firm at New York

The price of 1.20c, Pittsburgh, or 1.36c, delivered, on steel bars, appears firm in the New York and surrounding districts, despite lower prices reported in other sections. Specifications at 1.20c. are reported by leading makers to be running fair this month. New business remains small.

(*For complete prices see page* 688)

Plate Mills Not So Busy

Weakness develops in the east and also at Chicago

Mills rolling plates and shapes in western Pennsylvania have decreased operations about 8 or 10 per cent, and are now running at about 66 per cent of capacity, which is not surprising, in view of the fact that manufacturers estimate new orders the last six weeks at about 33 per cent of capacity. Eastern plate mills have entered the territory to some extent, but additional competition has failed to further affect prices. Plates are obtainable at 1.15c, and reports of that figure being shaded are heard. Structural shapes appear about $1 a ton stronger than plates.

While 1.15c, Pittsburgh, is generally considered the prevailing price for plates for delivery in the Cleveland district, 1.20c is occasionally paid on a small lot. A boiler concern in northern Ohio is in the market for 985 tons of plates.

Plates Weak at Chicago

At Chicago steel plates have been weaker than other steel products for several weeks and appear to have struck rock bottom with little demand, principally due to the absence of railroad car building. The price has been 1.33c to 1.38c, Chicago, and appears to be pegged at that point until the market becomes more active. The past week has been practically devoid of demand for cars, and this is reflected in the inactivity of the plate market.

Light Sales at Cincinnati

Prices are holding at 1.30c, Cincinnati, and have not lost any strength, although the market has been quiet during the past week. Sales are limited mostly to light tonnages.

Cutting in the East

In the eastern Pennsylvania district, 1.15c, Pittsburgh, or 1.30c, Philadelphia, now represents the general market and one seller accepted 1.10c, Pittsburgh, in a single case. Small lots still bring 1.20c, Pittsburgh. New business is of a more miscellaneous character. Eastern mill operations are falling off.

Car Material More Active

In the New York and other eastern districts, 1.15c, Pittsburgh, or 1.31c, New York, is quoted now very generally on plate lots of size. It is reported that especially attractive tonnages might bring out an even lower price from certain mills. New business is rather slow, but the car market the past week has been more active. The Water Board, New York City, takes bids April 14 on about 4,000 tons for a 66-inch pipe line of the Catskill aqueduct. The Newport News Shipbuilding & Dry Dock Co. has been awarded a coal freighter by the Crowell & Thurlow Steamship Co., Boston, requiring 2,000 to 3,000 tons, largely plates.

Railroad Scrap in East

Sold at going prices—Tendency is toward softness

March railroad lists in eastern Pennsylvania brought about the going market at $11 and over, delivered, on heavy melting steel, $13.50, delivered, for No. 1 railroad wrought and $12 and over, delivered, for car wheels. Buying in eastern Pennsylvania is quieter. While prices are quotably stationary, the undertone is weak. The Bethlehem Steel Co., offering $7.75, delivered, for heavy borings, now is getting some tonnage at this figure.

Old Orders at New York

New York dealers report a light volume of trading in old material. The principal activity of the market at present is the covering of old orders, in which $9.20, New York, has been paid for heavy steel. A new order of 500 tons of steel for an eastern Pennsylvania consumer was taken at $11, delivered. Canadian consumers have been buying some car wheels. Only a moderate tonnage of scrap now is coming upon the market, but, fundamentally, prices are weak.

Deadlock at Pittsburgh

Consumers in the Pittsburgh district are refusing to pay more than $12 for heavy melting steel, and at some plants purchasing agents will not pay above $11.75. Leading dealers are not attempting to sell, although they confess there is little prospect of immediate improvement.

Uncertainty at Cincinnati

Business done in the scrap market in the past six days has been so light that prices have become very uncertain and have fluctuated over a wide range. The total tonnage booked of each material has not been large enough to be used as a test and quotations are being made in accordance with the conditions of each sale. The market is weaker, and gives no indications of recuperating from the slight decline that occurred last week. Demand from surrounding cities is in excess of that from local melters, but it has not been especially heavy for any one grade.

Softening at Buffalo

The scrap market in the Buffalo district remains practically inactive in all lines. There has been a slight softening of prices of the various commodities listed by the Buffalo dealers, but not enough so to alter previously published schedules. Consumers and dealers alike are waiting for developments. The latter say they anticipate an improvement. The leading local user of heavy melting steel, who has been out of the market for some time, is again accepting moderate-sized lots of material. Borings and turnings are a little weaker than the other lines.

Standstill at Cleveland

Demand from mills continues negative and dealers are not actively engaged in trading among themselves; so the market for scrap is just about at a standstlll. Affairs seem to have settled down to a dullness approximating that of November and December. Prices, however, are holding somewhat higher than at that period, due to important developments pending, dealers say, which may decide the future course of the market. Quotations are unchanged from last week.

Chicago Scrap Still Dull

No improvement is noted in the scrap iron and steel market in Chicago territory and comparatively little is moving except such as was contracted some time ago. Prices are near the lowest level and no indication of improvement is seen. The leading user of scrap in this vicinity is buying only small tonnages offered at bargain prices.

The past week has seen a smaller quantity of railroad scrap offered than recently, about 2,500 tons being presented. This total includes about 150 tons of long steel rails by the Chicago & Alton and an equal quantity by the Mobile & Ohio. The Chicago,

(*For complete prices see page* 688)

Milwaukee & St. Paul, Chicago & Alton, Mobile & Ohio, Grand Trunk and Wabash offer small lots which total the quantity mentioned above.

Declining at St. Louis

Inquiry for relaying rails continues good in the St. Louis market and there is some demand for steel and foundry cast, but prices generally are on the decline. The demand from the rolling mills is very dull.

Furnace Coke

Contracted for by southern Ohio company

A southern Ohio furnace has closed for about 50,000 tons of 48-hour coke for the last half which will be furnished for the Pocahontas fields. Outside of this, the market in Cincinnati is very quiet on new orders, and requisitions to forward shipments on old contracts on foundry grades are slower. Some Pocahontas furnace coke is available at $2, ovens, for prompt delivery, but contract prices are from $2.10 to $2.25, ovens. New River furnace coke is being quoted at $2.50, ovens, which is the same at which Pocahontas, Wise county and Connellsville makers are holding their foundry grades.

The Connellsville coke market is decidedly quiet, although leading operators have not changed their position regarding prices. Blast furnace fuel is held at $2, ovens, but spot coke is selling at $1.90 frequently. Demand for foundry coke has fallen off somewhat. The *Connellsville Courier*, for the week ending March 28, says production was 360,018 tons, a decrease of 3,262 compared with the week before.

The demand for shipment of coke on contracts continues good at St. Louis, but new business is seldom heard of. Connellsville and Virginia 72-hour foundry grades are quoted at $2.75, nominally.

Reduced Operations

Iron and steel pipe mills in the Pittsburgh district have reduced operations slightly, some of them not doing better than 50 per cent of capacity, while others are producing material largely to replenish stocks. Prices, manufacturers say, are firmly held, despite inactivity. No especially large orders have been placed this week.

Joseph Sondermann, owner of the former Geise manufacturing plant at Grand Island, Neb., has had it put in shape for active foundry work, which it started the latter part of March.

Cast Iron Pipe Award

Made at Cleveland to United States company—Other contracts

The United States Cast Iron Pipe & Foundry Co. has been awarded the contract to furnish the city of Cleveland 7,600 tons of cast iron pipe. The bids submitted for the pipe f. o. b. cars Cleveland were as follows:

By the Camden Iron Works, Philadelphia, 3 to 24-inch, $22.80; 30, 36 and 42-inch, $22.25; 48-inch, $22. The total bid of this company was $169,817.50.

By the United States Cast Iron Pipe & Foundry Co., Cleveland, 3-inch, $34.35; 4-inch, $24.35; 6 to 48-inch, $22.35; total bid, $170,000.

By the American Cast Iron Pipe Co., Birmingham, 3-inch, $30.90; 4-inch, $25.90; 6-inch to 10-inch, $23.90; 12-inch to 24-inch, $23.40; total bid for the sizes named, $44,135.

The United States Cast Iron Pipe & Foundry Co. offered to deliver the 7,600 tons of pipe on the streets of Cleveland for $176,080 and for this reason the waterworks officials decided that it submitted the best bid.

Contracts were also awarded for 230 tons of special castings, on which the tonnage was divided between the United States Cast Iron Pipe & Foundry Co. and the Bowler Foundry Co., the latter company getting the sizes below 16 inches.

Slow at Chicago

The Chicago market in cast iron pipe has presented no features in the past week, but promises to be interesting in the next few days. Following its victory in competition for 1,600 tons of pipe at Cincinnati, the United States Cast Iron Pipe & Foundry Co. is low bidder on a further letting of 2,100 tons in that city. The award is expected to be made shortly.

A letting of unusual interest to cast iron pipe makers will take place next Monday at Highland Park, Mich. Bids will be opened at that time for 58,200 feet of pipe. Whether this will be cast iron, steel or wood has not been determined, as the city has only so much money to spend and the material will depend on the price. Should cast iron pipe be decided on, this quantity will approximate 13,000 tons.

Eastern Bookings Decline

Bookings of cast iron pipe by eastern makers in March fell considerably below January and February, which were good months. Current conditions are about the same as in March. Prices show some irregularity. The United States Cast Iron Pipe & Foundry Co. took 1,500 tons of 16-inch for Springfield, Mass. The Department of Water Supply, Gas and Electricity, New York City, is taking bids this week on 1,500 tons of 6, 8 and 12's. Other inquiries include 500 tons of small pipe for New Brunswick, N. J., to close April 14; 260 tons of 6, 8 and 12's for Salem, Mass.; 175 tons of 48-inch for the Board of Water Supply, New York City, to close April 14.

(*For complete prices see page* 688)

Wire and Wire Rods

Manufacturers of wire products in the Pittsburgh district have failed to benefit by the opening of spring, and many express the opinion that the usual spring buying movement will fail to develop this year, inasmuch as the jobbing trade is in a position to meet demands of consumers. Shipments are fairly heavy, but below normal for this time of the year. Prices have not been tested.

Business done in wire rods during the past eight or ten days has been light and limited to small orders. Quotations are openly being made at $27, Ashland, Ky.

Inquiry for Ferro Alloys

Inquiries for about 1,200 tons of ferro-manganese are pending before sellers at New York, including one round lot for eastern delivery. Small sales of English ferro at $39, seaboard, are noted and German material commonly is quoted at $38, seaboard.

Will Move Offices

Chicago, April 7.—Offices of the United States Steel Corporation and its subsidiaries will be removed about April 15 from 72 West Adams street to the new Continental & Commercial National Bank building, at Adams and La Salle streets. The Corporation offices will occupy the 11th, 13th, 14th, 15th, 16th and 17th floors.

The American Refractories Co. will remove April 10 from 72 West Adams street to the 18th floor of the same building.

The American Bar Lock Co. has acquired a site 450 x 180 feet in Long Island City, where it will erect a large plant for the manufacture of skylight bar fastenings and door fastenings.

Structural Material Mart

Shows improvement in some centers, but lags badly in others

About 12,000 tons in prospective work in eastern Pennsylvania is before the mills, which is better than for several weeks. The largest lot is 4,000 tons for the Bell Telephone building, Philadelphia. It is not accepted by makers, however, that these larger tonnages signify a permanent improvement. Generally the market remains slow and the mills are dropping their operations because of reduced specifications. Some mills now are running not over 50 per cent. The usual price for shapes is 1.15c, Pittsburgh, or 1.30c, Philadelphia, with some unconfirmed rumors of lower being possible. Fabricating competition is keen, one large job bringing out 2.03c per pound, delivered.

Elevated Line Work

While, as reported, the apportionment has been made by the general contractors, of the 50,000 tons of fabricated steel for the third-tracking of elevated lines in New York City, the final release of this tonnage to the various fabricators still awaits the formal approval of the Interborough Rapid Transit Co. Unofficially, it is understood the work will be distributed about as follows: American Bridge Co., 18,000 tons; McClintic-Marshall Co., 13,000 tons; Milliken Bros., Inc., 8,800 tons; Pennsylvania Steel Co., 5,500 tons; Phoenix Iron Works, about 3,500 tons, and Belmont Iron Works, 1,200 tons. Another subway section, 5,000 tons, is offered in the metropolis, making three now pending. Other awards in the metropolis not connected with rapid transit developments, continue light. Plain material is selling quite freely at 1.15c, Pittsburgh, or 1.31c, New York, in that district.

Inquiry for structural material in the Pittsburgh district is somewhat better, although manufacturers fear some of the contemplated projects may not materialize. The Riter-Conley Mfg. Co. has taken a number of attractive orders for steel tanks.

Inquiry for structural material shows improvement in the Cleveland district. The principal inquiry is due to bridge projects.

Shapes Weaken at Chicago

At Chicago structural shapes appear to possess less strength than was the case earlier in the year. New enterprises have not come to the front in sufficient number to furnish volume for the productive capacity, and while prices have been holding fairly well, the struggle for business appears to have brought them lower than current quotations indicate. It appears that 1.38c to 1.43c, Chicago, is close to the price paid for much of the tonnage taken recently. However, this consisted of small projects where there was no objection to cutting the price. That 1.38c, Chicago, has been shaded on more attractive business is believed by well informed structural men.

Only One Large Structure

With the exception of one structural contract in Chicago, the tonnage awarded in the west last week consists of five small contracts, none of which contain 350 tons. The exception is the office building to be erected at East Washington street and North Wabash avenue by a syndicate headed by J. O. Heyworth. The structure will require about 3,600 tons and this has been taken by the American Bridge Co.

CONTRACTS AWARDED

Four 50-foot diameter steel tanks for Huasteca Petroleum Co., Tampico district, Mexico, Riter-Conley Mfg. Co.

Steel stack, 17-foot diameter, 200 feet high, involving 300 tons, for Solvay Process Co., Syracuse, N. Y., Riter-Conley Mfg. Co.

Trestle and limestone bin, blast furnace plant Pittsburgh Steel Co., at Monessen, Pa., 250 tons, Riter-Conley Mfg. Co.

Four precipator tanks, 20-foot diameter, 65 feet high, 300 tons, for Aluminum Ore Co., St. Louis, to be erected at East St. Louis works by Riter-Conley Mfg. Co.

Forty-eight steel tanks, 10-foot diameter, 20 feet high, for Indian Refining Co., New York, Riter-Conley Mfg. Co.

Machine shop for the Putnam Machine Co., Fitchburg, Mass., 800 tons, awarded the McClintic Marshall Co.

Construction work for city of Memphis, Tenn., 1,500 tons of steel sheet piling, awarded the Jones & Laughlin Steel Co.

Waitt apartment hotel, 309 West Eighty-ninth street, New York City, 500 tons, awarded to the Hedden Iron Construction Co.

Loft building for Adroit Realty Co., 32-34 West Thirty-first street, New York, 600 tons, awarded to an independent fabricator.

Courthouse, Albany, N. Y., 2,000 tons, awarded to Levering & Gerrigues.

Hippodrome, Baltimore, 500 tons, finally awarded to the Harris Silvers & Baker Co. This contract formerly was reported to have gone to another fabricator.

James residence, East Seventieth street, New York City, 400 tons, awarded to the American Bridge Co.

Three apartments, West Philadelphia, 200 tons, awarded to the Belmont Iron Works.

Bridges for Virginian railway, 300 tons, awarded to the Roanoke Bridge Co.

Addition to Massillon Rolling Mill, 230 tons, to the Jones & Laughlin Steel Co. The Massillon Bridge Co. will do the fabricating.

Howes Construction Co., New York City, has taken contract for 250 tons of structural for the City Trust Co.'s new building at Utica, N. Y.

State board of harbor commissioners, two car ferry, slips, San Francisco, Cal., 330 tons, to Vulcan Iron Works, San Francisco.

Rockford Gas Light & Coke Co., miscellaneous steel, Rockford, Ill., 242 tons.

Theater building, Seattle, Wash., 216 tons, to Central Trust Co., Seattle, Wash.

CONTRACTS PENDING

The Buffalo Structural Steel Co. is low bidder on the 150 tons of steel needed for the new Green apartment building to be erected in Buffalo, by Green & Wicks, architects, for the Green Realty Co., Buffalo.

Building for Bell Telephone Co., Philadelphia, 4,000 tons; bids being taken.

Bridge work for Washington & Southern railroad, 2,300 tons; bids being taken.

Agricultural office building, Washington, D. C., 650 tons; bids entered.

High school, Germantown, Pa., steel estimated about 1,000 tons; bids being taken.

Building for new plant of the Taylor-Wharton Iron & Steel Co. at Easton, Pa., 3,000 tons; the McClintic-Marshall Co. low bidder.

Extension of plant of National Roll & Foundry Co., Pittsburgh, 1,000 tons; bids being taken.

Chicago Street Viaduct, Buffalo, 2,250 tons, revised bids being received by the City of Buffalo, original tenders having been rejected.

Section No. 2 of the Broadway-Fourth avenue subway line, New York City, 5,000 tons; bids to be taken on the general contract April 24.

Bridge over the Muskingum river at Dresden, O., 500 tons.

Bridge at Massillon, O., 500 tons.

Car Inquiries

Make better showing—Orders for rails

New York, April 8. (By wire.)—It develops that the Pennsylvania railroad also has placed 5,000 tons of rails each under the old specifications with the Cambria and Pennsylvania Steel companies in addition to an equal amount under new specifications, making the total order 20,000 tons. In this way, a comparison between the old and new specifications will be made. The Louisville & Nashville has placed 5,000 tons of rails additional with the Tennessee company, and a southern line inquires for 10,000 tons.

New orders and inquiries for cars for the past week make a better showing. The Southern Pacific railroad is putting out inquiries for 5,100 cars of assorted types, or about the same number as purchased for this line last year, when the Harriman system proper bought a total of 13,400 cars. In January, the Union Pacific, another Harriman line, bought 5,000 cars. These roads now buy singly under the recent dissolution decree. The New York Central system asks 500 steel automobile box cars for the Michigan Central.

(*For complete prices see page* 688)

Total pending inquiries for cars now reach about 15,000.

Car orders placed in the week total 4,000. The Chicago & North Western bought 2,000 box cars from the Pullman Co., and the Great Northern 2,000 automobile cars from Haskell & Barker.

Pursuant with the previously announced plan, the Pennsylvania railroad has awarded 5,000 tons of 120-pound open-hearth rails each to the Pennsylvania Steel Co. and to the Cambria Steel Co., which are to be rolled according to its new specifications. It is purposed to test how the new specifications work out as to cost and applicability, in actual manufacture before releasing the order for the year's requirements.

CAR AND LOCOMOTIVE ORDERS.

The Chicago & Northwestern railroad has placed 2,000 steel underframe box cars with the Pullman Co.

The Louisville & Nashville railroad has ordered 18 locomotives, to be built in its Louisville shops and is in the market for 10 additional locomotives.

The St. Louis & San Francisco railroad is inquiring for 10 locomotives.

The Queen & Crescent railroad is in the market for five locomotives.

The Southern Railway Co. has ordered five superheater Mikado freight locomotives from the American Locomotive Co.

The Korean Government Railways has placed nine superheater 10-wheel locomotives with the American Locomotive Co.

The Norfolk & Western railroad is figuring on the purchase of 30 locomotives.

The Great Northern Railroad has ordered 2,000 automobile cars from Haskell & Barker.

The New York Central System is inquiring for 500 steel automobile box cars for the Michigan Central Railroad.

Adolph E. Hoffman, manufacturer of files and cutlery, died at his home at Frankfort, Philadelphia, March 31.

Frick's Gift

To McKinley memorial to be erected at Niles

Henry C. Frick has made a subscription of $50,000 to the fund for the erection of the national McKinley birthplace memorial at Niles, O. The idea of erecting a memorial to President McKinley at his birthplace, which was conceived by Joseph G. Butler Jr., has met with so much favor that the building will be much more imposing than was originally planned. The city of Niles is taking great interest in the memorial and is arranging to devote a whole square in the center of the city to it. There will be an auditorium, a relic room, a library and other features. Mr. Frick's contribution makes it possible for a creditable library to be a part of the memorial building. Subscriptions to date amount to $150,000, but Mr. Butler is confident of adding $100,000 more before work on construction is started.

Otis Steel Co. Director

A. W. Tait, of London, Eng., has been elected to a vacancy on the board of directors of the Otis Steel Co., Cleveland, caused by the death last September of Thomas Frame Thomson. . He will be made chairman of the board. Mr. Tait is a prominent financier of London and is identified with numerous important industries in England.

The Otis Steel Co., April 1, paid a 1 per cent dividend on the common and 3½ per cent on the preferred

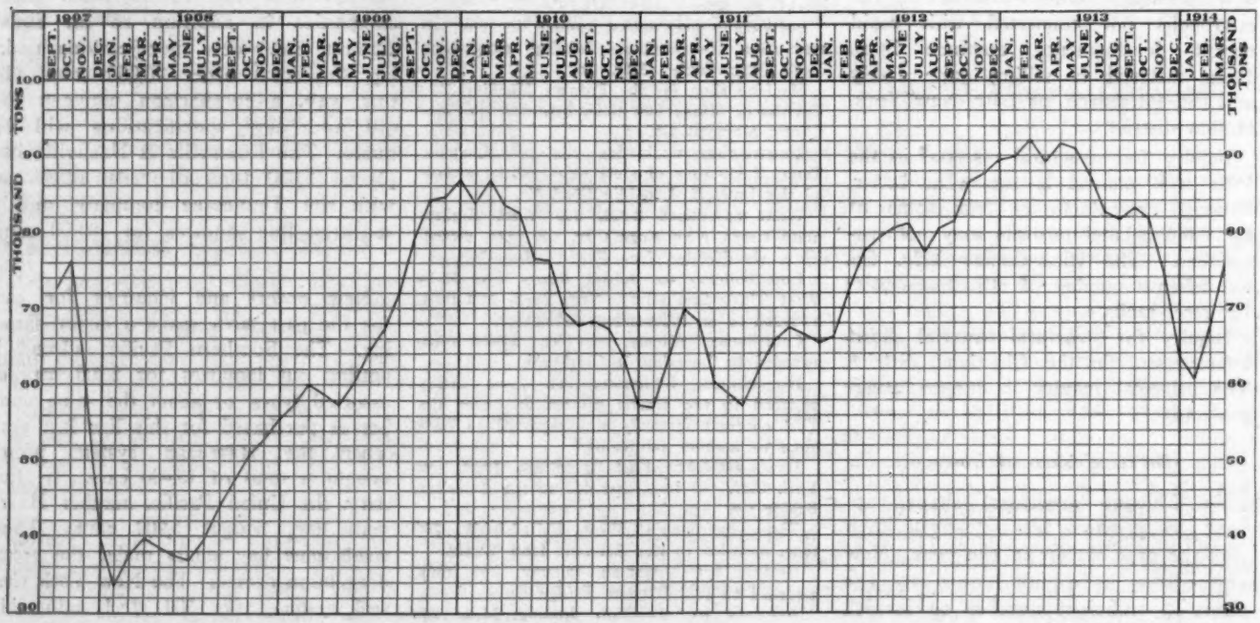
Work on the new plant of this company at Cleveland, is proceeding satisfactorily. The jobbing mill will be in operation about July 1 and the 72-inch plate mill by Sept. 1. The next mill to be put in operation will then be the 96-inch plate mill.

American Shipbuilding Passes Dividend

The directors of the American Ship Building Co. have decided to pass the preferred dividend for the remainder of the fiscal year, which ends June 30. Thereafter dividends will be paid semi-annually instead of quarterly. In a statement to the shareholders, the directors stated that the net earnings of the company are sufficient to pay the 7 per cent dividend for the entire fiscal year, but that certain losses on construction on contracts taken prior to the beginning of the fiscal year have made it advisable to pass the dividend and thus begin the new fiscal year with these losses absolutely wiped out. The change from quarterly to semi-annual payments is dictated by the fact that it is impossible to determine exact profits on the business quarterly. While preferred dividends are noncumulative, the statement seems to infer that as the dividend just passed has actually been earned, the directors may in their discretion declare it later.

Chicago Building Award

New York, April 8. (By wire.)—The Heyworth building, Chicago, requiring 4,000 tons of steel, has been awarded to the American Bridge Co.



AVERAGE DAILY PRODUCTION OF COKE AND ANTHRACITE PIG IRON

Pig Iron Output Gains in March

Increase over February is 450,000 Tons—Net gain of 13 in active blast furnaces

A net gain of 13 in active blast furnaces, combined with the longer month, resulted in March showing a large gain over February in the production of coke and anthracite pig iron. The output last month was 2,341,551 tons, compared with 1,888,607 tons in February, a gain of 452,944 tons.

The steel works, or non-merchant furnaces, 16 of which were relighted in March, showed the larger gain. Their production last month was 1,657,720 tons against 1,302,620 tons in February, a gain of 355,100 tons. The merchant furnaces produced 659,514 tons in March, and 572,145 tons in February, a gain of 87,369 tons.

The average daily production of the steel works furnaces was 53,475 tons in March and 46,522 tons in February, a gain of 6,953 tons. The daily rate of production of merchant iron was 21,275 tons in March and 20,434 tons in February, a gain of 841 tons. The combined daily average output was 75,534 tons in March and 67,450 tons in February, a gain of 8,084 tons.

AVERAGE DAILY PRODUCTION.

	1914.	1913.	1912.
January	60,624	89,929	66,220
February	67,450	92,095	72,372
March	75,534	89,123	77,791
April	.....	91,812	79,254
May	.....	90,865	80,753
June	.....	87,229	81,125
July	.....	82,525	77,502
August	.....	81,839	80,650
September	.....	83,137	81,482
October	.....	81,933	86,569
November	.....	74,322	87,985
December	.....	63,746	89,590

Active stacks on the last day of March numbered 232, compared with 219 on Feb. 28, a gain of 13. Seven merchant furnaces were relighted in March and five blown out, a net gain of two. Sixteen non-merchant stacks resumed in March and five went out, a net gain of 11. In all, 23 stacks were relighted and 10 blown out.

Ferro production in March was 11,707 tons, against 9,216 tons in February, a gain of 2,491 tons. The output of spiegel in March was 12,610 tons and in February, 4,626 tons, a gain of 7,984 tons.

Merchant furnaces relighted last month were: One Buffalo, Buffalo Union Furnace Co.; Standish, Northern Iron Co.; Lawrence, Marting Iron & Steel Co.; Warwick No. 2, Eastern Steel Co.; Emporium, Emporium Iron Co.; Palmerton No. 2, New Jersey Zinc Co.; Thomas, Thomas Furnace Co.

Merchant furnaces blown out were: Hattie Ensley, Sloss-Sheffield Steel & Iron Co.; Woodward No. 3, Woodward Iron Co.; Iroquois "B", Iroquois Iron Co.; Wayne, Detroit Furnace Co.; Crozier No. 1, Virginia Iron, Coal & Coke Co.

Steel works furnaces relighted were: Joliet No. 1, Illionis Steel Co.; Maryland No. 1, Maryland Steel Co.; Harriet "X", Wickwire Steel Co.; Emma and one Shoenberger, American Steel & Wire Co.; Grace, Brier Hill Steel Co.; one Bellaire and one Duquesne, Carnegie Steel Co.; Haselton No. 4, Atlantic and Hall, Republic Iron & Steel Co.; Youngstown "B", Youngstown Sheet & Tube Co.; one Aliquippa, Jones & Laughlin Steel Co.; Leesport, Leesport Furnace Co.; Steelton No. 1, Pennsylvania Steel Co.; one Swede, Alan Wood Iron & Steel Co.

Steel works furnaces blown out were: Alabama City, Gulf States Steel Co.; Bessemer No. 3, Tennessee Coal, Iron & Railroad Co.; South Chicago No. 1, Wisconsin Steel Co.; one Central, American Steel & Wire Co.; Cambria No. 5, Cambria Steel Co. for rebuilding.

MONTHLY PRODUCTION.

	1914.	1913.	1912.
January	1,879,336	2,787,800	2,052,806
February	1,888,607	2,578,670	2,098,796
March	2,341,551	2,762,823	2,411,529
April	.....	2,754,353	2,377,621
May	.....	2,816,825	2,503,341
June	.....	2,616,883	2,433,737
July	.....	2,558,275	2,402,567
August	.....	2,537,018	2,500,163
September	.....	2,494,098	2,444,454
October	.....	2,539,924	2,683,645
November	.....	2,229,960	2,639,562
December	.....	1,976,138	2,777,292
Totals	6,109,494	30,652,767	29,325,513

Osborn Harmony Club

The Harmony Club, composed of officers and employes of the J. M. & L. A. Osborn Co., Cleveland, met in the club rooms, 1047 Superior avenue N. W., on Friday and Saturday, April 3 and 4.

An interesting program, combining business and pleasure, was carried out.

The opening session was devoted mainly to the solution and explanation of problems by J. W. Lucas, manager of sales. With the aid of fictitious orders, each member was asked to figure costs and selling prices. The practice resulted in some very instructive and helpful lessons.

On Saturday afternoon, a general discussion relative to the sheet metal business was held, closing with an experience meeting that demonstrated how much interest and enthusiasm the club has aroused since its last meeting in December.

Following six o'clock dinner at the chamber of commerce, a very interesting lecture was delivered by J. C. Rahming, business builder. The subject chosen, "What is a Salesman For?" It was the consensus of opinion that this was the most profitable talk with which the club has been favored since its organization.

MARCH PIG IRON.

States.	No. of stacks.	No. in blast last day of month. Mar.	Feb.	Total tonnage made. Merchant.	Non-Merchant.	Totals Mar.	Feb.
Pennsylvania	158	97	87	157,758	821,296	979,054	814,931
Ohio	73	51	46	135,252	412,613	547,865	448,549
Alabama	45	17	21	135,842	24,037	159,879	136,354
Virginia	22	7	8	30,134	.....	30,134	26,165
New York	26	15	12	75,168	59,038	134,206	101,278
New Jersey	7	2	2	9,997	.....	9,997	10,155
Illinois	26	14	15	35,466	155,720	191,186	147,781
Colorado	6	2	2				
Indiana	10	8	8				
Maryland	4	2	1				
Wisconsin	6	4	3	29,192	160,210	189,402	132,374
Kentucky	7	2	2				
West Virginia	4	3	3				
Tennessee	18	5	5				
Washington	1	0	0	25,563	24,806	50,369	33,593
Georgia	2	0	0				
Texas	3	0	0				
Minnesota	1	1	1				
Michigan	3	2	3				
Missouri	1	0	0	25,142	.....	25,142	23,585
Spiegel—All states...						12,610	4,626
Ferro—All states....						11,707	9,216
Totals	423	232	219	659,514	1,657,720	2,341,551	1,888,607

Hill Properties

Surrendered by Corporation, being developed

The trustees of the Great Northern Iron Ore Properties in their seventh annual report show the steps being taken by the Arthur Iron Mining Co., a subsidiary, to develop those lands, formerly covered by the "Hill ore lease", but already surrendered by the Steel Corporation.

In 1912, $300,361 was spent for mine development, while last year this expense totaled $1,057,360. Three large mines are being stripped, one of which, the Smith, is ready for shipping. It contains 600,000 tons of ore. The Dean-Itasca mine, formerly called the Whiteside, which contains 5,500,000 tons of ore, can ship ore this year. At the Dunwoody mine, 8,000,000 tons of ore will be ready for working by July 1, 1915, and a portion of the ore body will be exposed by Aug. 1 of this year.

Other development work includes the lease to Butler Bros., St. Paul, of lands on the western Mesabi. The lessee is required to erect a washing plant of a capacity to produce at least 100,000 tons of concentrated ore in 1916, and afterwards.

The receipts of the trustees during 1913 were $1,133,889, and the disbursements were $823,144, giving a surplus for the year of $310,745. The balance of undistributed income on Dec. 31, 1913, was $3,763,799.

Shipments by the Steel Corporation under the "Hill" lease, in 1913 were 5,236,889 tons, a decrease compared with either 1911 or 1912. As shown by the following table, the average iron content was the highest of any year with the exception of the small tonnage shipped in 1908.

Year.	Tons shipped.	Iron content.	Average royalty.
1907.....	137,270	58.7641	$0.838726
1908.....	508	65.1498	1.180295
1909.....	41,624	56.4001	.792687
1910.....	2,046,970	56.9633	.853830
1910.....	106,007	—49.00	.30
1911.....	5,344,078	58.2148	.945308
1911.....	155,681	—49.00	.30
1912.....	7,435,051	58.3212	1.186650
1912.....	55,458	—49.00	.50
1913.....	5,221,987	59.6211	1.283936
1913.....	14,903	—49.00	.50
	20,227,488	58.4905	$1.111151
	332,049	—49.00	.342380

Light Iron and Steel Imports

The advance sheets of the department of commerce showing imports and exports for February, 1914, indicate that imports continue very light. Only 3,426 tons of pig iron were brought in, compared with 12,816 tons in February, 1913. Importations of scrap amounted to only 1,342 tons, compared with 6,604 tons one year ago. In bar iron, the importations last February were 2,011 tons, compared with 2,569 tons in February, 1913. Semi-finished steel, now on the free list, shows importations of only 15 tons, compared with 1,245 tons in February, 1913. There were no importations of rails, and in February, 1913, only 199 tons were brought in. Importations of tin plate, terne plate and taggers tin in February, 1914, were 3,274 tons, compared with 275 tons a year ago. Wire rods, wire and articles made from wire, showed importations of 414 tons in February, 1914, compared with 832 tons in February, 1913. The total value of iron and steel and manufactures of imported was $2,175,746 in February, 1914, compared with $2,587,158 in February, 1913.

Exports also showed a sharp decrease. The total value of all iron and steel exports for February, 1914, was $16,520,260, compared with $24,089,871 in February, 1913.

Dutch Bid Lowest

On four steel tugboats for Panama service

Washington, April 8.—Considerable interest is being manifested in the awards of bids opened March 23 by the Isthmian Canal Commission for four steel tugboats for handling and docking of vessels at the entrance to the Panama canal. The bids have been sent to the isthmus for the authorities there to pass upon, after which announcement of the successful bidder will be made. In the competition are two foreign ship builders, four American private plants and three navy yards.

The N. V. Industrieele Handel Mattschappij, Rotterdam, Holland, represented by Ward & Co., Washington, is the lowest bidder. Its bid was $128,350 for each boat, or a total of $513,400 for all four, with delivery at Colon. Its alternative bid was $122,350 for each boat, or $489,400 for all four, with delivery at the builder's yards, Rotterdam or Amsterdam. The lowest bid received from an American private plant was, for the four boats, delivery at Colon, $149,000 each, submitted by the Staten Island Ship Building Co., Port Richmond, N. Y. For two tugboats, delivered at Colon, this company bid $152,000 each, and for the four, delivered at the builder's yards in New York harbor, the bid was $144,500. For two delivered at the builder's yard, the company made a bid of $147,500. The Charleston, S. C., navy yard submitted the lowest bid of the three yards.

New Features

Of foundry practice will be shown at convention

At a meeting of officials of the American Foundrymen's Association, held at the Hotel La Salle, Chicago, Saturday, April 4, plans for the convention to be held in September were tentatively discussed and the program was outlined. The meeting was attended by Alfred E. Howell, president; R. A. Bull, vice president; A. O. Backert, secretary, and H. B. Swan, member of the program committee. A large number of papers already have been promised and there is every indication that the professional sessions will develop many new features of foundry practice.

At a luncheon given by the Chicago Foundrymen's Club, and at which the officers of the American Foundrymen's Association were guests, announcement was made of the election of the local committees in charge of the convention preparations. H. O. Lange, Ferguson & Lange Foundry Co., was elected president of the general committee; David Evans, Chicago Steel Foundry Co., secretary, and H. L. Hanson, Chicago Steel Foundry Co., assistant secretary.

The reception committee for the American Foundrymen's Association consists of the following: J. A. Galligan, Pickands, Brown & Co.; L. C. Young, McDowell Foundry Co.; William Francis, Francis & Nygren Foundry Co.; Eugene Smith, Crane Co.; Alex. Thompson, H. W. Caldwell & Son Co.; Thomas J. Sheriff, Sheriff Mfg. Co.; J. G. Girrard, Northwestern Malleable Iron Co.; James Wood, Sheffield Foundry Co., and J. P. O'Neil, Western Foundry Co.

Reception committee for the American Institute of Metals: E. P. Welles, Charles H. Besly Co.; I. M. Bregowsky, Crane Co.; I. N. Perlstein, Great Western Smelting & Refining Co.; Fred Moerl, Pullman Co.; Charles McNellis, Imperial Brass Mfg. Co., and Harold Wolff, L. Wolff Mfg. Co.

Entertainment committee: A. G. McKinley, Griffin Wheel Co.; S. T. Johnston, S. Obermayer Co.; C. A. Hardy, Whiting Foundry Equipment Co.; C. E. Hoyt, Foundry & Machine Exhibition Co., and H. A. Pridmore, Henry E. Pridmore.

Banquet committee: C. B. Carter, American Brake Shoe & Foundry Co.; N. C. Peebles, Edgar Allen American Manganese Steel Co., and O. J. Abell, Iron Age.

Printing committee: A. O. Sonne, Rogers, Brown & Co.; Richmond Nicholas, Hickman, Williams & Co., A. B. Hawes, Mathew Addy & Co.

What's the Matter With Farmers?

Explanations for their failure to buy as formerly—Views of editors of agricultural papers

In accounting for the present extreme dullness in the demand for iron and steel products, one frequently hears complaints on the part of sellers of iron and steel products, particularly those selling steel bars to the implement manufacturers, that the purchases being made by the agricultural interests are far below those usually made at this time of the year. The implement manufacturers say that they find it extremely difficult to persuade farmers to buy

In order to ascertain, if possible, why the farmers are not buying farm implements, wire and other iron and steel products as liberally as usual at this time of the year, the editor of THE IRON TRADE REVIEW addressed a letter to a number of editors of agricultural journals of the country, stating the complaint that is being made and asking the following questions:

Have crop failures anything to do with it?

Are uncertain prices a factor?

Are imports of farm products under the new tariff interfering with the prosperity of the American farmer?

Is it true that many farmers are sacrificing everything else in order to buy automobiles, or are there other explanations of the absence of the farmer from the market?

A number of intensely interesting replies have already been received and are published herewith. Others will be published next week.

How the Manufacturers Fail

By C W Burkett[1]

Your letter of the 2nd inst. regarding the dullness at the present time in the demand for iron and steel products and asking as to why this should exist in reference to the manufacture of farm implements and tools, is possibly answered in several ways.

Just after the 1907 panic people were cautioned to get along with what they had. They were told that hard times were ahead, that money would be scarce and that credit for improvement and development would be difficult to obtain. Farmers, among the rest, felt this pinch. Many of them would have added to their implement supplies, possibly enlarged on buildings and other conveniences, had they been able to have obtained the money. Unquestionably, they did join in the procession and restricted their purchases.

Up till recent years, there was also a possible over-production of agricultural implements and tools. The farms were flooded with agents in order to dispose of these products and manufacturers had their warehouses and storehouses filled to the roof. These manufacturers knew as well as anybody that they did have big supplies and they gradually cut down. The surplus stocks of tools and implements are fast disappearing, and it is just as likely that within the next two or three or five years there will be an unprecedented demand for such as there was an over-production back two or three years ago.

Another factor of note of considerable moment centers around the general teaching in efficiency. People are taking better care of their tools and implements. Farmers have been taught to use oil more freely, and thus the tools last longer. They have been taught to paint tools and implements, as well as buildings, and paint has increased the life of implements of thousands of farms. It is unquestionably true also that implements are better today than they were 15 or 20 years ago. The life of a tool or implement was short a decade or two ago, and today better tools are available for everybody; because of better material used in them, they last longer.

Tommyrot About Automobiles

You ask if farmers are using fewer tools than they used to. Indeed they aren't. They are using more tools than they ever did in the past. In my judgment, I am satisfied that it is all tommyrot about laying the dullness in the implement trade to the purchase of automobiles by farmers. Undoubtedly, the best selling ground for automobiles today is among farmers, but 99 out of 100 farmers who buy automobiles are entitled to buy one. They have not only got the money to buy an automobile, but they are far enough on easy street to do it without any hardship or handicap to them in their business. These stories circulated that farmers are mortgaging their farms or otherwise going in debt to buy automobiles is the purest kind of tommyrot and drawn right out of mythical reasoning. I can simply answer that by saying that "'taint so."

Undoubtedly some sections of the country are not requiring as many implements in the bulk as they did 10 to 25 years ago. Take the newer portions of the west. There were thousands and tens of thousands of farms that each year were being equipped and built up. It took an immense amount of implements and tools to meet this demand, but these farms after they got established and equipped required less tools than they did before. There will always be a steady, continuous demand for farm implements in these sections and in these states, but an exaggerated sale will not result in the future. Certainly the south is taking more implements than ever. The south today is one of the greatest selling grounds for farm implements and tools. Down there during the past 25 years it has been largely the bull tongue plow, the mule and the nigger. That is changing. One-third of the farms of the country

(*Continued on page* 682)

[1]Editor, American Agriculturalist, New York, April 4.

MEN OF THE IRON TRADE

Who they are Where they are What they are doing

After 27 years of active mill service in the employ of the Carnegie Steel Co., during which time he advanced from a foremanship to the superintendency of the company's largest plant, Azor R. Hunt, superintendent of the Homestead Steel Works, at Munhall, Pa., has resigned. He plans to leave the company May 1. Supt. Hunt's name, like that of his predecessor, A. C. Dinkey, now president of the company, always will be closely connected with the iron and steel industry of this country, and particularly with the development of rolling mill practice at the Homestead works. Mr. Hunt was born Aug. 22, 1848,

RICHARD PETERS JR.
New Member of the American Iron & Steel Institute

at Canfield, O. From his early youth, he was mechanically inclined. When 20 years old, after completing his education in the grammar and high schools of his native town, he went to Warren, O., where he learned the mechanic's trade. At night he studied mechanical engineering. In 1887, he went to Homestead, having obtained a position as night foreman in the beam department of the Carnegie mill. Nine years later he was appointed superintendent of the plate mill department at the Homestead plant, in which capacity he served until 1901, when he became superintendent of the Duquesne steel works of the Carnegie company, at Duquesne, Pa. In 1903, Mr. Hunt returned to the Homestead works, where he gained his first experience in the rolling mill industry, succeeding Mr. Dinkey as superintendent of that mill.

Richard Peters Jr., a new member of the American Iron and Steel Institute, was born in Calhoun, Ga., in 1880. He was a member of the class of 1900, Swarthmore college, Pennsylvania, taking an engineering course. He was connected in an executive capacity with an eastern steel foundry for four years, and wishing to get into blast furnace business, went to Rising Fawn, Ga., furnace in the capacity of chemist. After a short stay there, he became engaged in mining in Alabama. In 1907, he went to Birmingham as assistant treasurer and purchasing agent of the Birmingham Coal & Iron Co. and served as vice president and treasurer in 1912, having charge until the company was absorbed by the Woodward Iron Co. He continued in that capacity, liquidating the affairs of the Birmingham Coal & Iron Co. In the summer of 1913, he became associated with the W. J. Rainey interests and continued in their service until recently, when he resigned to become connected with the Producers' Coke Co., Uniontown, Pa. He is calling on the blast furnace trade in the interest of that company's product.

Thomas C. Satterwaite, secretary and treasurer of L. F. Shoemaker & Co., Pottstown, Pa., steel fabricators, has resumed actively his duties after a period of illness.

Rodney D. Day, formerly with the Dravo-Doyle Co., Pittsburgh, has resigned to take charge of the office which The William Tod Co., Youngstown is opening in Pittsburgh.

Vernon L. Phillips, of Perry, Buxton, Doane & Co., Philadelphia, was elected president of the Eastern Iron and Steel Merchants' Association at a recent meeting at Philadelphia. This is an organization of prominent eastern Pennsylvania scrap brokers which was formed some years ago to bring about certain reforms in the scrap trade and which since has been inactive. The association recently decided not to admit the dealers to the organization.

C. A. Buck was added to the board of directors of the Bethlehem Steel Corporation at the annual meeting held at Newark, N. J., April 7. Harry Bronner, Allan A. Ryan and Chas. M. Schwab, whose terms were expiring, were re-elected.

W. E. Porter, who has taken a prominent part in the smoke abatement problem in the Pittsburgh district, has been appointed assistant chief smoke inspector of that city, a position recently created by city council, and occupied until April 1 by J. M. Searle. Mr. Porter is well equipped for his new position, having a thorough knowledge of chemistry

W. E. PORTER,
Assistant Chief Smoke Inspector of Pittsburgh

and metallurgy. For several years he has devoted practically all his time to furnace work and the economical burning of furnace coals, particularly the high volatile coal of the Pittsburgh district. Mr. Porter has been associated with the Blake Co. the last two years in the development of a process for burning powdered coal under boilers and different types of metallurgical furnaces.

S. W. Nicholson has resigned as superintendent of the Guernsey works of the American Sheet & Tin Plate Co., at Cambridge, O., to embark in business with his son.

Hugh F. McKnight, who has been connected with the Cincinnati office

MEN OF THE IRON TRADE

Who they are Where they are What they are doing

of the Carnegie Steel Co. for the past seven years, has resigned to accept the position of manager of the Samuel F. McKnight Hardware Co. of Pittsburgh.

P. McN. Bennie has severed his connections with the Fitzgerald & Bennie Laboratories located at Niagara Falls, N. Y. For this reason, the firm has changed its name to the Fitzgerald Laboratories, Inc., and is sending out announcement cards to that effect.

Col. H. P. Bope, vice president and general sales manager, the Carnegie Steel Co., Pittsburgh was toastmaster at the annual banquet of the Ohio

H. L. AUSTIN
Assistant Comptroller United States Steel Corporation

Society of Pittsburgh, April 3 at Hotel Schenley, at which Gov. James M. Cox, of Ohio, was the honor guest.

I. de Bluym and F. W. Shipley have been elected directors of the M. Rumely Co., of Laporte, Ind., to succeed A. J. Rumely and C. P. Holton.

Jas. N. Wallace, president of the Central Trust Co., New York City, has been elected a director of the Westinghouse Electric & Mfg. Co., to succeed Thos. W. Lamont, resigned. H. H. Westinghouse fills the vacancy on the board caused by the death of George Westinghouse.

E. H. Mumford, vice president and general manager of the Mumford Molding Machine Co., has transferred his office from New York to the factory of his company at 2059 Elston avenue, Chicago. While in New York, Mr. Mumford personally may be addressed in care of the Machinery Club.

Willard C. Brinton, a member of the American Society of Mechanical Engineers, will read a paper on "Graphic Statistics for the Engineer and Executive" before the society at its headquarters, 23 W. Thirty-ninth street, New York City, Tuesday, evening, April 14.

James C. H. Ferguson, for the past 13 years Pacific coast sales agent of the Midvale Steel Co., of Philadelphia, has severed his connection with that company and is now the Pacific coast representative of the William Cramp & Sons Ship & Engine Building Co., of Philadelphia, with his office in the Monadnock building, San Francisco.

Walter C. Allen, who for the past five years has been general manager of the Yale & Towne Mfg. Co., in charge of the sales policies and management in all departments excepting the bank lock department, has been elected a vice president, and as vice president and general manager will continue to perform the important duties implied by the titles. Mr. Allen entered the company's service in 1891, and worked his way up through minor positions until, in 1905, he was assistant general superintendent under the late Fred T. Towne. At the death of Mr. Towne, in 1906, Mr. Allen was appointed his successor. In 1909, he was transferred to the general offices of the company, New York City, as general manager. At the head of the three broad divisions of the business, responsible directly to the president, are: Walter C. Allen, vice president and general manager; Joseph A. Horne, general superintendent of works; John B. Milliken, treasurer (finances, accounting and statistics). Beside Vice President Allen, the list of officers elected at the recent meeting of the board of directors is as follows: Henry R. Towne, president; Schuyler Merritt, vice president; J. H. Towne, secretary; John B. Milliken, treasurer.

H. L. Austin, auditor of the American Sheet & Tin Plate Co., Pittsburgh, since its organization ten years ago, has been appointed assistant comptroller of the United States Steel Corporation. He will be associated with W. J. Filbert, comptroller. Mr. Austin's first experience in the sheet and tin plate trade was obtained when he joined the Crescent Sheet & Tin Plate Co., Cleveland. In 1899 he accepted a position in the auditing department of the American Tin Plate Co., Chicago, and was subsequently transferred to the New York office of that concern. He was chosen auditor of the American Sheet & Tin Plate Co. when that organization was formed. George M. McGinnis, who was assistant auditor of the American

GEORGE M. McGINNIS,
Auditor American Sheet & Tin Plate Co.

Sheet & Tin Plate Co., has been named Mr. Austin's successor. Mr. McGinnis' connection with the steel trade has been very similar to that of his former associate. He became identified with the Apollo Iron & Steel Co., Vandergrift, Pa., in 1897; three years later he was appointed assistant auditor of the American Sheet Steel Co., at New York, and was appointed auditor of that company in 1903. The latter part of that year he became assistant auditor of the American Sheet & Tin Plate So. Roland J. Hadly, former chief clerk of the accounting department, has been named assistant auditor.

Brands Labor Federation Curse

But other unions are praised by O. P. Briggs—Inquiry of Industrial Commission

Washington, April 8.—Intensely interesting was testimony given before the United States Commission on Industrial Relations by O. P. Briggs, former president of the National Founders' Association.

Surrounding his evidence were points which grew out of the so-called New York agreement, between the association and molder's union, effected in February, 1899, and abrogated by the association on Nov. 5, 1904, because of intolerable conditions brought about by unreasonable demands of the union.

"They simply would not arbitrate," said Mr. Briggs emphatically at different times. He made that out as one prominent point, and, after describing in detail the provisions of the New York agreement, he showed how the union refused to live up to its very fundamental principle, which called for arbitration, or every honorable plan to avoid strikes.

The American Federation of Labor was described by Mr. Briggs as a curse, while at the same time he held up as models the union brotherhoods of the railway trainmen.

During the life of the New York agreement, Mr. Briggs said, there were at least 2,500 conferences held, either nationally or locally and that there were 500 shops included.

"I sat in at least 150 of those committee meetings," said Mr. Briggs. "After a while conditions changed. Instead of promoting industrial peace, they promoted serious conflict. There were, I think, 150 shops which struck during the existence of that agreement. We would reach a certain point. Then we deadlocked. Conditions became so strained that the foundrymen, believing no progress was being made, in three or four years, made a final effort to arrive at some method of settling the recurring differences."

The dispute between the foundrymen and molders, which outweighed all other opposition, Mr. Briggs said, was the matter of apprentices. "The union attempted to dictate as to the policy we should adopt toward them."

"Do you believe an employe has a fair opportunity to get a fair wage where he deals individually with an employer?" inquired Mr. Thompson.

"Yes, indeed," replied Mr. Briggs, "very much fairer than when he deals through a union." Mr. Briggs then called attention to the fact that only 2.48 per cent of the country's population is represented by labor unions, and between 8 and 10 per cent of workers of the country are organized. He said no one objects to unionism when the proprietor is allowed the rights given any man under the constitution of the United States.

Unreasonable Opposition

Another great difficulty, he said, which was encountered with the unions was their opposition to molding machines, differential wage rates, limitations of output and earning capacity, "and last, but not least, the question of the open shop." Nothing ever came of the consideration, he said, of the question of a national rate. Conditions being different, he said, the association could not successfully follow its attempt to adhere to the lines of the National Stove Founders' Defense Association.

After again branding the American Federation of Labor as a bad union, Mr. Briggs pointed to some of their demands as being illegal in the eyes of the law.

"It is not a question of more laws we need in this country," he declared. "It is not a question of more legislation. What we want is obedience to our present laws, and if this government would compel obedience to our present laws, a great deal of turmoil over labor differences would be over."

"It has been my observation," said Mr. Briggs, in reply to a question by Commissioner Harris Weinstock, of California, "that 90 per cent of the meetings of unions affiliated with the American Federation of Labor are held over or near saloons, and there are more men in the saloons than at the meetings."

"Then you think intemperance among American Federation of Labor men is increasing?" inquired Mr. Weinstock.

"Yes, sir, I do," replied Mr. Briggs. "But not among the brotherhoods of the railroad unions."

Mr. Briggs was asked by Mr. Weinstock if it were not true that the National Founders' Association objected to paying a minimum wage to men who were not worth it, but did not object to the minimum wage in itself. Mr. Briggs said that was exactly the attitude of the founders.

The real break which caused the abrogation of the New York agreement resulted from the demand of the National Founders' Association that the wages of molders in Utica, N. Y., be reduced 15 per cent, according to testimony given last evening by Joseph Valentine, Cincinnati, president of the International Molders' Union. He was first examined by Prof. Barnett, of Johns Hopkins University.

It was the contention of the molders, said Mr. Valentine, that neither side could put into effect a new wage without first holding a conference. The 15 per cent reduction was refused by the molders, it was asserted, and they asked for a conference, conditions to remain in statu quo pending the outcome of the conference.

Mr. Valentine's Testimony

"Employers in Utica told us," said Mr. Valentine, "that they were advised by the Founder's association to put the reduction into effect and thus place the grievance on the side of the molders. The reduction was ordered. A strike resulted. We said the molders must be reinstated pending the result of a conference. But the conference was denied." Mr. Valentine said that such tactics violated the agreement and that if they could be pursued molders could have asked for an increase and secured it pending a conference.

The agreement the molders have with the Stove Founders' National Defense Association, it was said, is different from that had with the Founders' association. In the former, he said, it was decided to approach question for conciliation through conferences. There have been about 20 meetings, it was said, in 24 years and without a single strike. The National Founders' Association outlined a policy, Mr. Valentine said, which it wanted to "cram down the molders' throats."

Other witnesses were John P. Frey, Cincinnati, editor Molders' *Journal*, and Thomas J. Hogan, Chicago, secretary Stove Founders' National Defense Association.

The hearings were temporarily finished last night, but neither side was satisfied with the outcome of the testimony and both gave notice they would file briefs with the commission and ask for further hearings, which probably will be held at St. Paul or Chicago.

Electric Freight Locomotives

Description of new 63-ton machines designed by the General Electric Co. for Piedmont & Northern Railway

Up to the present time most of the switching around steel plants has been done by steam locomotives, but the conditions which have led to the general adoption of electric drive for mill machinery are operating to effect a change in the motive power used in the plant railways. Already some steel manufacturers, notably the Brier Hill Steel Co., at Youngstown, have equipped their open-hearth charging floors with electric switching locomotives. The accompanying article describing the chief features of six new heavy freight locomotives, which the General Electric Co. recently delivered to the Piedmont & Northern lines, is therefore timely. Although the engines described were designed for road service, with a few simple modifications they could be adapted to heavy switching work, such as that handled at large steel plants.

THE Piedmont & Northern Lines, Charlotte, N. C., are placing in commission six new 1,500-volt, direct current electric locomotives on the Greenville, Spartanburg & Anderson division. These locomotives weigh 63½ tons, with all the weight on drivers, have the box type of cab extending nearly the entire length of the underframe. They are designed for heavy freight service. At the normal rating of the four motors, with which each locomotive is equipped, operated 1,500 volts, two in series, they will develop a tractive effort of 17,500 pounds and a speed of 21 miles per hour. The locomotives will handle trains of 800 to 1,000 tons gross weight. The new locomotives were designed and built by the General Electric Co. The cab is of the all-steel box type and extends nearly the whole length of the underframing. Outside platforms of suitable width are left at each end for the switchman to handle the trolley poles and are protected by side and end hand or guard rails. In the interior, the cab is open throughout as far as is consistent with the apparatus located therein. While the operating mechanism is grouped in the central section, it is not located in a compartment separate from the engineer's operating cabs. Convenient passageways run along each side and connect with the operating position in each end. The cab is built up of steel channels and angles and sheet steel plates properly braced and riveted together, and is entered through center doors at each end.

The underframe or backbone of the locomotive consists of four 10-inch steel channels extending the entire length of the platform. The two four-wheel trucks are a swivel type, designed for heavy freight work, and conform to master car builder standards. The side frames are built of heavy rolled bars for top and bottom members with cast steel pedestals. The bolster, or center transom, is bolted rigidly to the side frames, and the entire weight of the truck framing is supported on heavy semi-elliptic springs hung by links to the double side equalizer bars, which in turn rest on the journal boxes. The journal boxes are a standard design with bronze bearings and wedges. The wheels are solid rolled steel, 36 inches in diameter. The axles are forged open-hearth steel, 6 inches in diameter between the wheels and with 5½ x 10-inch journals. The air brakes are the combined straight and automatic type. The brake shoes are inside hung, and the brake rigging is pro-

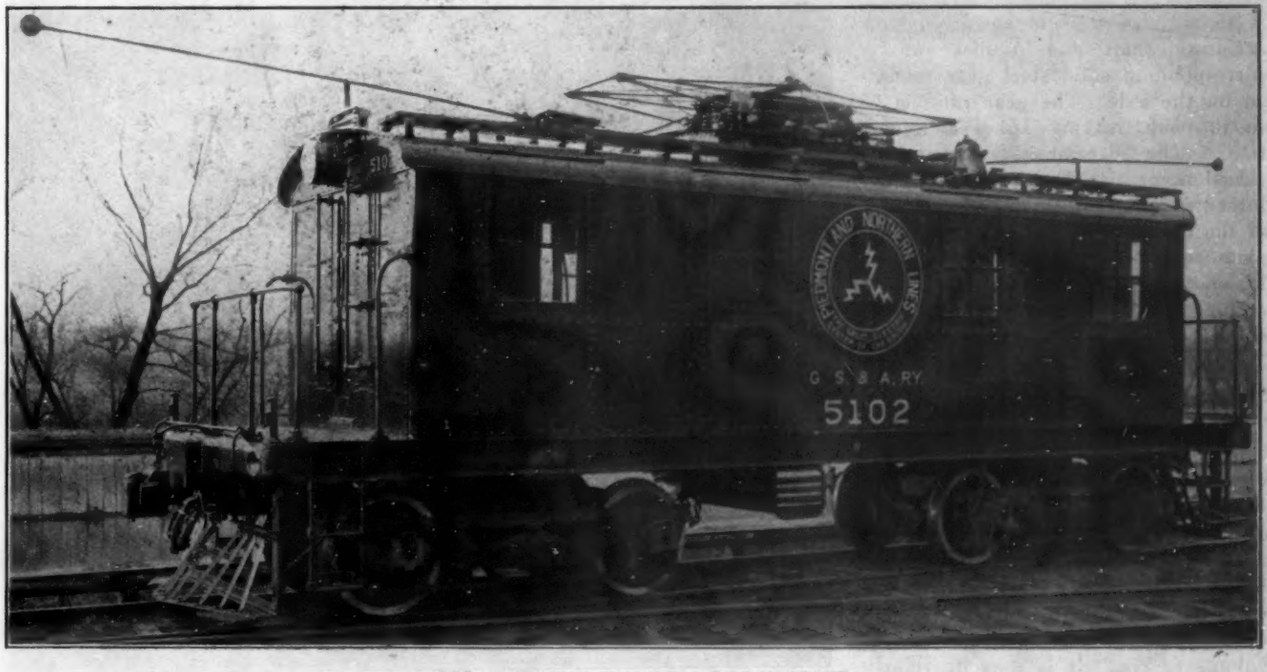


FIG. 1—HEAVY ELECTRIC LOCOMOTIVE

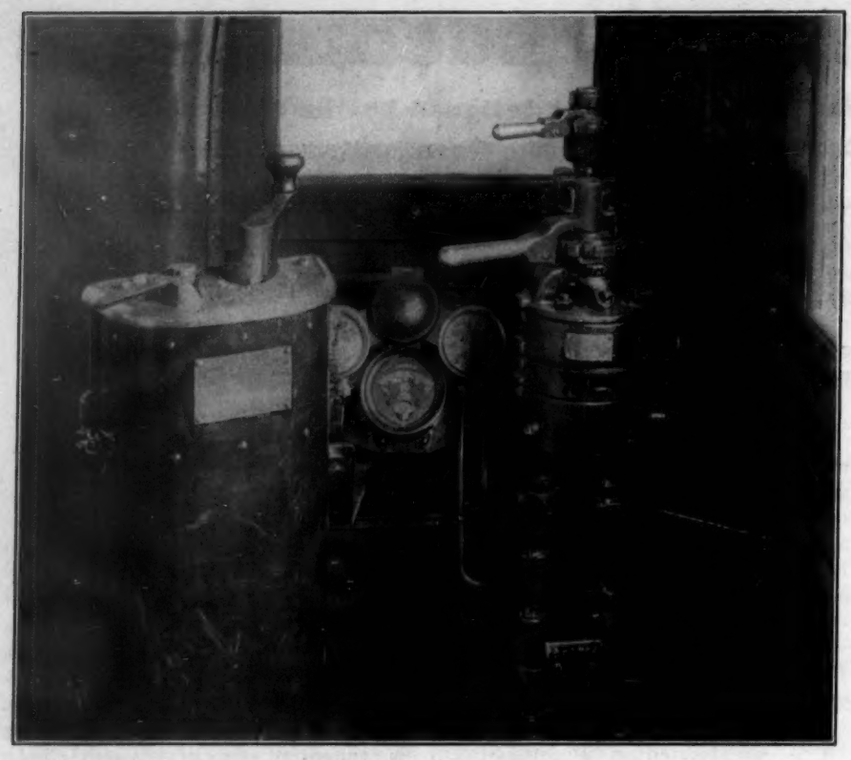


FIG. 2—MOTORMAN'S CAB ON ELECTRIC LOCOMOTIVE

portioned for a brake shoe pressure of 85 per cent of the weight on the drivers with 50 pounds pressure in the brake cylinders. Hand brakes are provided to hold the engine in the yard in case of loss of air pressure in the brake cylinders.

The locomotive is driven by four General Electric 600-1,200-volt box frame commutating pole motors, insulated for operation on 1,500 volts. Each motor is geared to an axle. All the axles are, therefore, driving axles. A forged pinion is mounted on each armature shaft and meshes into a corresponding solid steel gear mounted on the axle. The gear ratio is 65 to 18 teeth, making 3.61 gear reduction. The continuous capacity of each motor is 200 amperes under forced ventilation, and 269 amperes at the one-hour rating. For the complete equipment of four motors on a locomotive this is equivalent to a continuously sustained tractive effort of 11,200 pounds at the rail head.

Forced Ventilation

The motor is enclosed and is designed especially for locomotive service. Through the method of forced ventilation employed, air is circulated over the armature and field coils, over and through the commutator, through longitudinal holes in the armature core, and thence exhausted through openings in the bearing head. A large volume of cool air is thus distributed effectively throughout the motor, which keeps all parts at a uniform temperature and eliminates the possibility of hot spots.

The control equipment is the well-known Sprague-General Electric multiple unit system, arranged to operate the four motors in series and series-parallel connections. The pairs of motors with their respective resistances are all connected in series on the first point of the controller. The resistance is varied through six points and finally short-circuited on the seventh or running point. The pairs of motors are then operated similarly in series parallel and all resistance is cut out on the twelfth point, which is the full speed running point. This provides control connections with seven steps in series and five steps in series-parallel. The transition between series and series parallel is effected without opening the motor circuit, and there is no appreciable reduction in tractive effort during the change. This smooth transition between control points permits operating the motors close to the slipping point of the wheels throughout the entire range of acceleration without sudden fluctuations of tractive effort. Two switches are provided for cutting out either pair of motors, so that the locomotive can then be operated with one pair of motors in the usual manner.

Blower Set

The blower set which ventilates the motors has a capacity of 2,000 cubic feet per minute and is driven by a series-wound motor of the railway type. Air is taken from the exterior through a suction box with side louvres underneath the platform at the center. Current at 600 volts for the operation of the blower, air compressors, contractors and lights, is furnished from a two-fifths tap taken

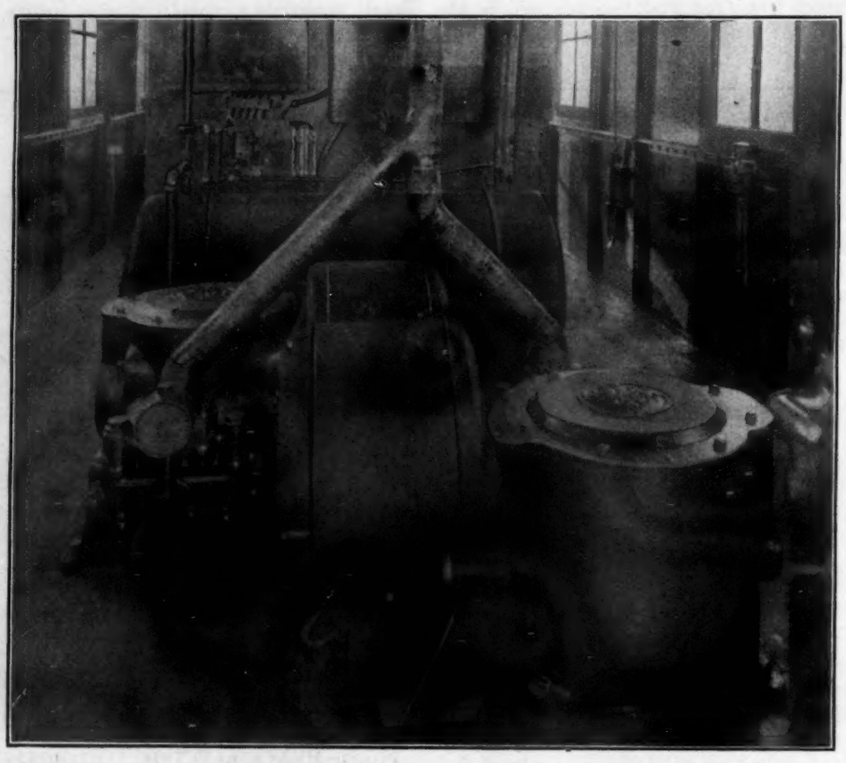


FIG. 3—AIR PUMPS AND OTHER AUXILIARY APPARATUS

from the dynamotor. The contractors are of the same general design as that employed in the standard 600-volt control. The principal modifications are embodied in the greater insulation distances and more effective methods of insulating where the contacts and magnetic blowouts make and break on the 1,500-volt circuit.

The air compressors are two-stage, motor-driven, and have a total piston displacement of 70 cubic feet per minute when pumping against a tank pressure of 90 pounds per square inch. Air is taken from the interior of the cab through strainer screens, which prevent the entrance of injurious particles of dust, and is delivered into the two air reservoirs, each 28 x 60 inches, connected in series, thereby affording an opportunity for radiation of heat and condensation of moisture before entering the air brake cylinders.

The sanders are pneumatically operated. Sand boxes of ample capacity are located alongside the door in each end of the cab, and the valves are arranged for sanding the track in front of the leading wheels at either end when running in either direction. Ladders for mounting to the roof of the cab are provided alongside the end doors together with grab railings in accordance with the Safety Appliance Act. The interior of the cab is illuminated by incandescent lamps. Included among these are two portable lamps with extension cords installed at the center in the side passageways. The bell is fitted with an automatic bell ringer and the whistle is air-operated. All wiring is drawn through conduits and carefully protected from mechanical injury. Two air signals are supplied, one in each end of the cab, to enable the switchman to signal the engineer.

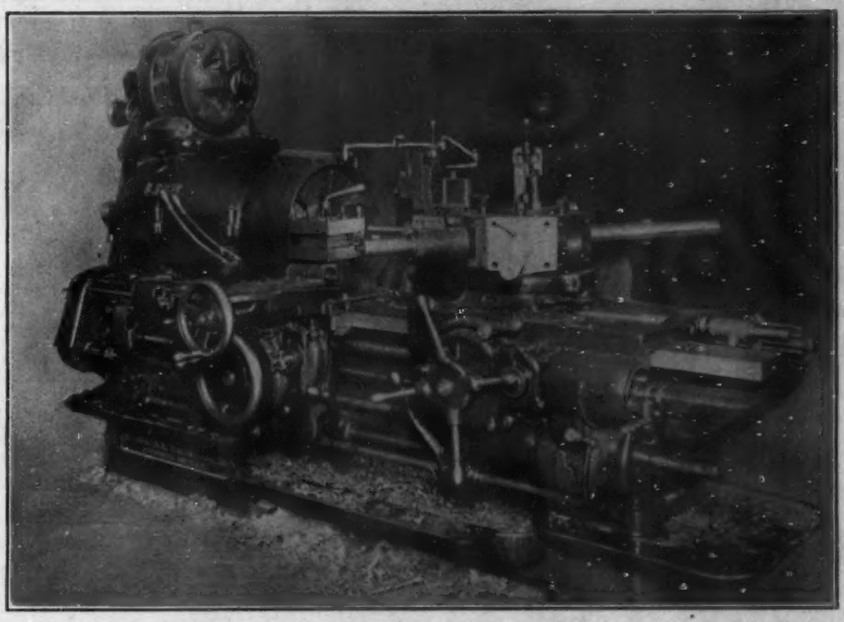
The principal dimensions of the locomotives are as follows:

	Ft.	In.
Length inside of knuckles	37	4
Length over cab	27	0
Height to trolley base	13	0
Width overall	9	7
Total wheel base	26	8
Rigid wheel base	7	2
Track gage	4	8½
	Pounds.	
Tractive effort at 25 per cent coefficient	30,000	
Tractive effort at one hour rating	17,500	
Tractive effort at continuous rating	11,200	
Weight per driving axle	31,750	
Weight electrical equipment	37,500	
Weight mechanical equipment	89,500	
Total weight on drivers	127,000	

The Phoenix Mfg. Co., Eau Claire, Wis., has installed equipment for making gray iron, semi-steel and chilled castings for the trade. The foundry of the company measures 100 x 200 feet, and the appliances are all operated by compressed air or electricity. The main bay is spanned by a 10-ton Pawling & Harnischfeger traveling crane equipped with a 5-ton auxiliary hoist. A number of small hoists manufactured by the Curtis Pneumatic Machinery Co., St. Louis, are used on the floor and two pneumatic elevators were furnished by the same concern to convey materials to the charging floor. There are two cupolas and the shop has a daily capacity of 25 tons of castings.

Rapid Lathe Work

At the foundry and machine exposition last October, in Chicago, the International Machine Tool Co., of Indianapolis, made some interesting tests on an 18-inch turret lathe. The machine was employed to turn drop forged gear blanks 8½ inches in diameter. The rough and finish boring was accomplished in 5½ minutes; the rough and finish turning, including facing on the rim and hub, required two minutes, the total average time for the job being, it is claimed, 7½ minutes.



TURRET LATHE TURNING GEAR BLANKS

The lathe was driven by a Westinghouse alternating current constant speed motor. The speed changes were effected through a sliding pinion and two double frictions so arranged that the operator could stop the machine in the middle of a heavy cut and start it again under feed. Stops were provided giving spindle speeds ranging from 8 to 300 revolutions per minute. The entire operative control of the machine is concentrated within easy reach of the operator and the lathe is so designed that the actual manual labor required of the workman is reduced to a minimum. There is every inducement to push the machine to its capacity.

Vanadium Dies

The Faul & Timmins Co., Buffalo, has adopted vanadium steel dies for punching sheet steel, case-type gaskets. The dies are so formed that they cut and draw in one operation. The gaskets are made from unpickled sheets 0.007 inch in thickness. The best production which could formerly be secured from ordinary tool steel dies without regrinding was 40,000 punchings. With vanadium steel dies, 90,000 punchings are secured. The die stock is manufactured by the Vulcan Crucible Steel Co., Aliquippa, Pa. When the dies are made, they are hardened in water at temperatures ranging from 1,350 to 1,475 degrees Fahr., according to the size of the tool, and are then drawn exactly like any other tool steel to a straw color, about 450 degrees.

A new cast iron brazing material known by the trade name of "Unifonte", is being placed on the market by the Phillips-Laffitte Co., Pennsylvania building, Philadelphia. This material is in the form of a paste which, combined with a flux and spelter, can be used to advantage for brazing cast iron. The brazing of the material is effected by the use of an ordinary brazing torch or gas blow pipe. No special plant is required for carrying out this process and tests of cast iron brazed with this material, it is claimed, show that the joint is much stronger than the original metal.

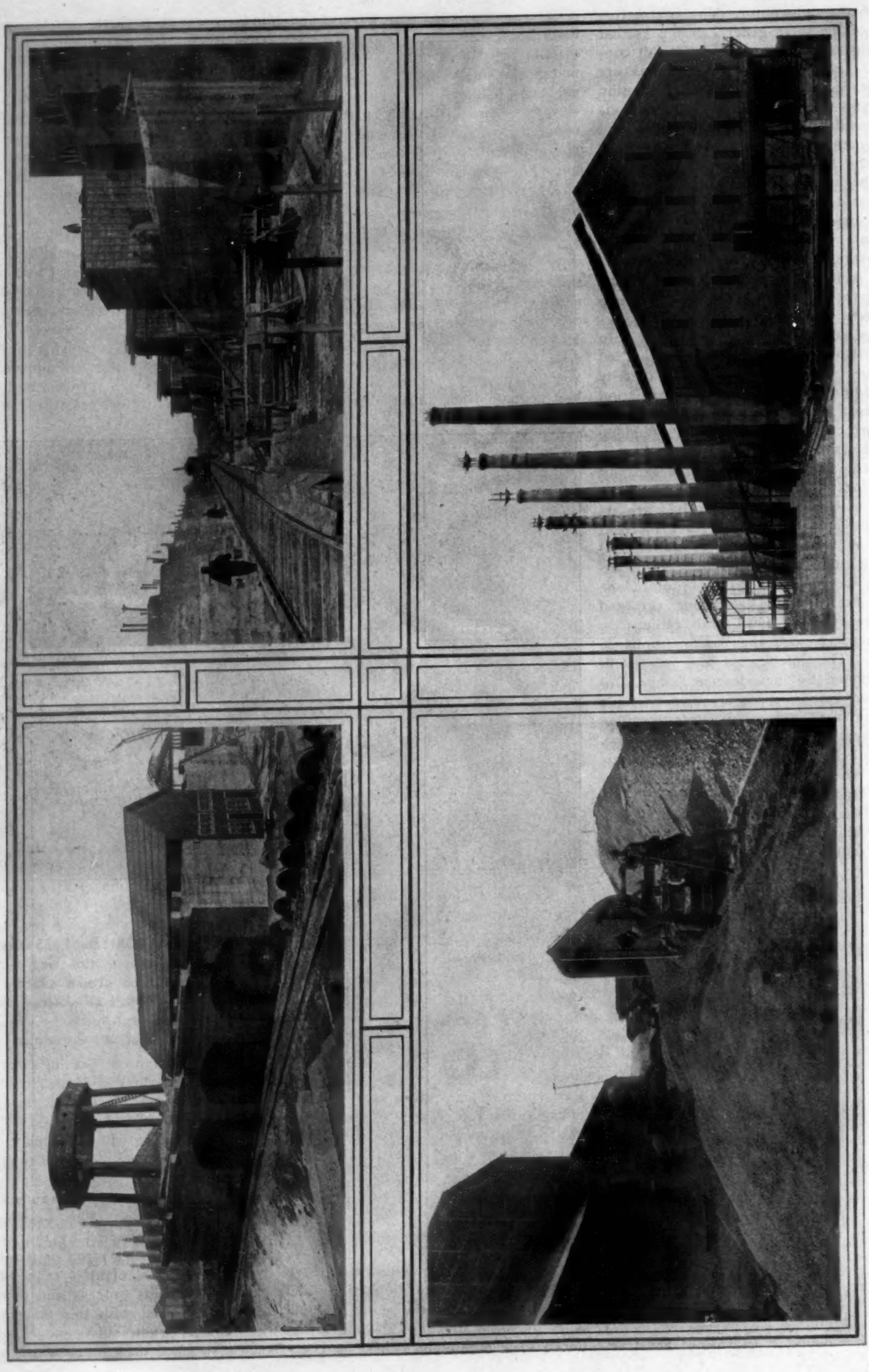


FIG. 1—BLAST FURNACE FOUNDATION
FIG. 2—OPEN-HEARTH FOUNDATIONS
FIG. 3—RECEIVING GRAVEL AT THE MIXING STATION
FIG. 4—REINFORCED CONCRETE CHIMNEYS

Use of Concrete in Steel Plant

How over 150,000 barrels of cement were used at the plant of the Minnesota Steel Co.

By G O Hays

CONSIDERABLE interest has been drawn to the extensive use of concrete in the construction of the plant of the Minnesota Steel Co. at Duluth, Minn., now rapidly nearing completion. Although iron and steel have been used generously throughout this plant, concrete has found a place not only for blast furnace, open-hearth furnace and building foundations, but for floors, walls and partitions, chimneys, sewers and numerous other places where brick, tile and wood might have been used. This feature was touched on briefly in a general description of the Duluth project which was published in THE IRON TRADE REVIEW, Nov. 13, 1913.

The blast furnace foundation, illustrated in Fig. 1 shows to some degree the manner and extent to which concrete has been placed. The steel columns and frame, which support the furnace walls, rest on a four-foot layer of brick, which is in turn supported by a monolithic concrete slab 12 feet thick. At the right, in Fig. 1, on either side of the contractor's temporary shanty, are the concrete-walled granulating pits for molten slag. These will be surmounted and spanned by a crane runway to permit loading cars located at ground level on tracks between pits. Immediately above the arches shown in Fig. 1 will be the cinder runway, supported partly on a cantilever shelf.

Open-Hearth Foundations

The adaptability of concrete is especially well illustrated in the construction of foundations and walls of the open-hearth furnaces, and foundation walls to support the regenerators, as shown in Fig. 2. The arches at the right form the foundations of the furnaces, and between these and the piers are the foundation walls to carry the furnace regenerator chamber. These rest on a concrete mat two feet thick and extending from the piers to the arches. The large quantity of concrete involved in pouring this mat was mixed in a central mixing plant and shipped to the work in six-yard side-dump cars.

In the central background, Fig. 7, is being erected a concrete smokestack, one of seven, the steel form being ready for casting the first ring. These are shown in Fig. 7, in connection with the open-hearth building, partly completed and again nearer completion, in Fig. 4. Although it has only been in recent years that this form of chimney construction has generally been acknowledged to be safe, the design and the methods of construction have been developed very rapidly until now there is little or no doubt concerning its desirability and general superiority over other types of construction. An excellent treatise on concrete chimneys, by Sanford E. Thompson, M. Am. Soc. C. E., is published by the Association of American Portland Cement Manufacturers, Philadelphia, and by the Universal Portland Cement Co., Chicago.

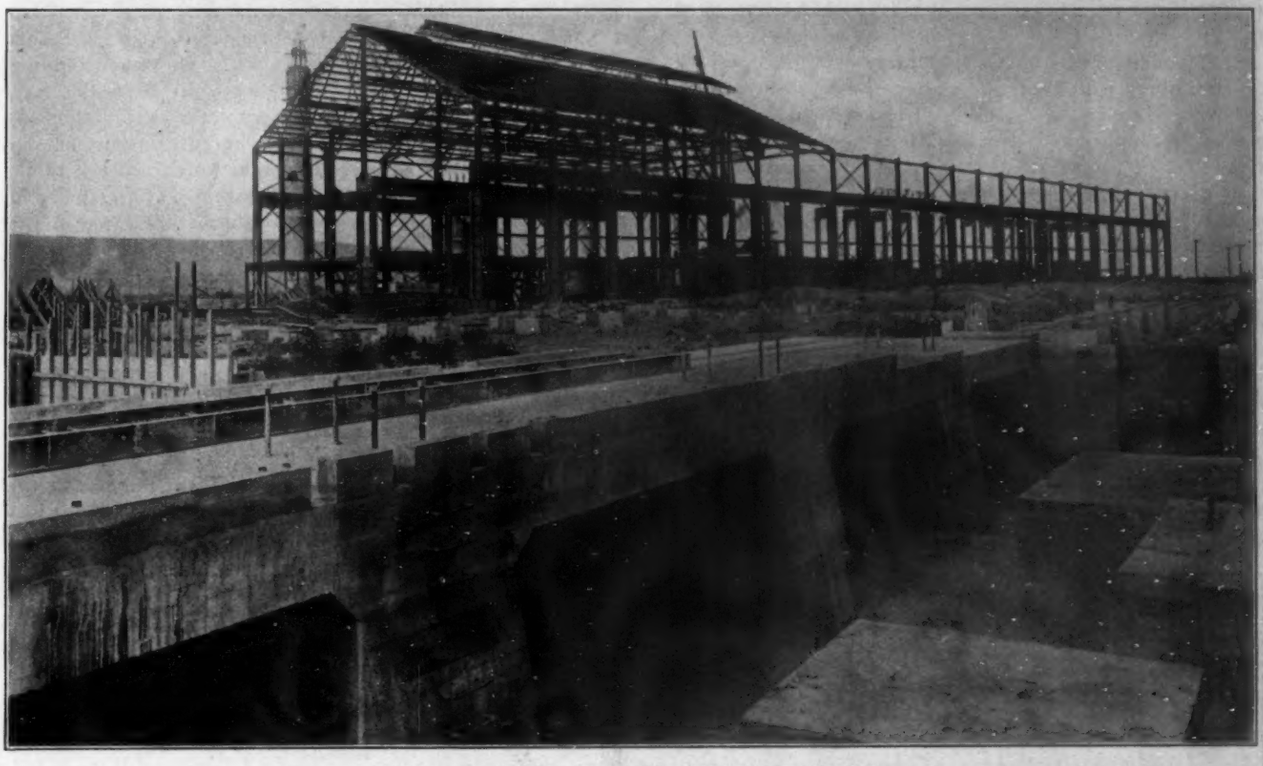


FIG. 5—CONCRETE SOAKING PIT FOUNDATIONS

The concrete foundations of the pit furnaces, with a concrete mat covering the entire area, and retaining walls holding back the fills on all sides, are shown in Fig. 5. The ingot chariot will travel on a track supported on steel girders built into the flat arches. These are not only heavily reinforced, but the spaces between the piers are spanned by 15-inch I-beams, embedded with the reinforcing steel as

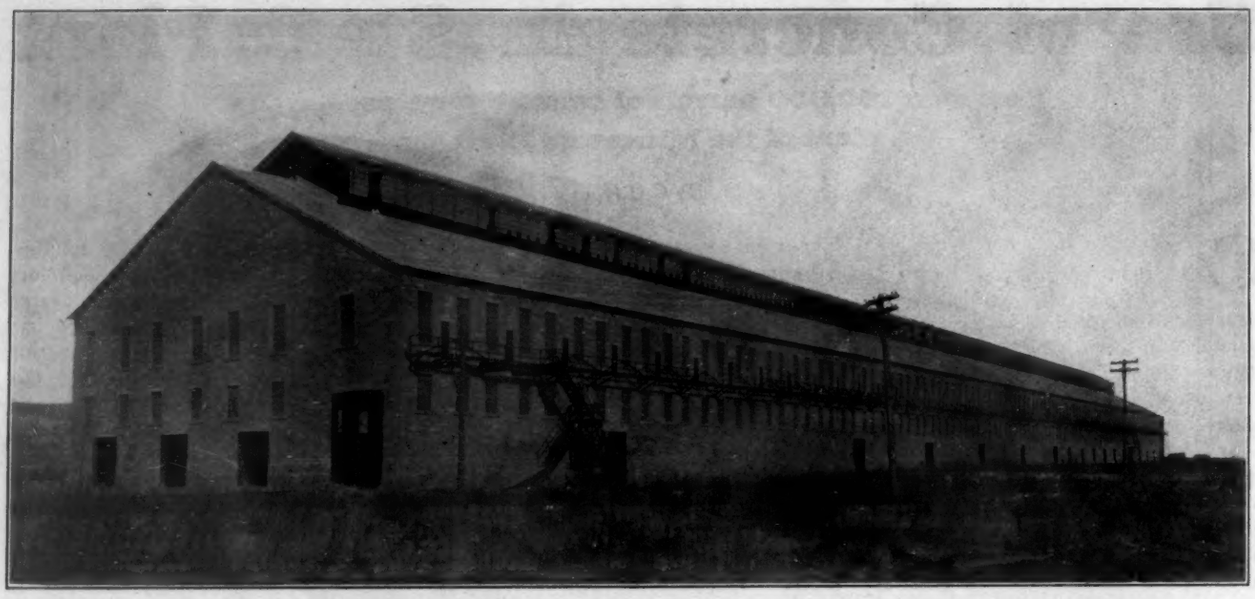


FIG. 6—MERCHANT MILL SHOWING ESCAPE PLATFORM

an additional precaution against heavy shocks.

The buildings are of steel frame construction, with curtain walls of two-piece concrete blocks. These blocks were designed by the Minnesota Steel Co., and are so constructed that a continuous air passage is left in the wall. These walls are shown in Figs. 4 and 7 and again in Fig. 6, the merchant mill building, which is 112 x 1,040 feet and 40 feet high to the roof trusses. The outside walls and stairway, floored with concrete slabs, gives access to the crane runway through numerous doors. Detroit Fenestra steel sash are used throughout.

A central mixing plant has been used in connection with all the concrete work. This plant is provided with elevator, screens, skip hoist and a cube mixer of 1¼ yards capacity, furnished by the Municipal Engineering & Contracting Co., Chicago. It is capable of delivering a batch of concrete every minute. The mixer discharges through a chute into 1½-yard Lockwood automatic buckets standing on flat cars, each car accommodating from five to seven buckets. They are unloaded either by a derrick or by a locomotive crane. Six-yard side-dump cars were used in conveying the concrete for the mat foundations, on account of the enormous quantity necessary for this monolithic work.

For making concrete blocks, bricks, tile and special shapes, a complete plant was erected at the start and is being kept in commission to assist in the construction of the plants of the Universal Portland Cement Co. and other subsidiaries of the United States Steel Corporation. The main building of this plant, which is 60 x 140 feet, is equipped with six hydraulic machines of the Ferguson type, manufactured by the American Hydraulic Stone Co., Denver. The sand and gravel, which come from a pit in the vicinity, are delivered to the plant over an industrial track by a Koppel car, as shown in Fig. 3. The aggregates are screened and measured and then placed in a bucket of the skip hoist with the proper amount of cement and elevated to the ½-yard Smith mixer. The mixer delivers to another Koppel car on an elevated track so located that it can dump into the bins connected with the block machines. In connection with this plant

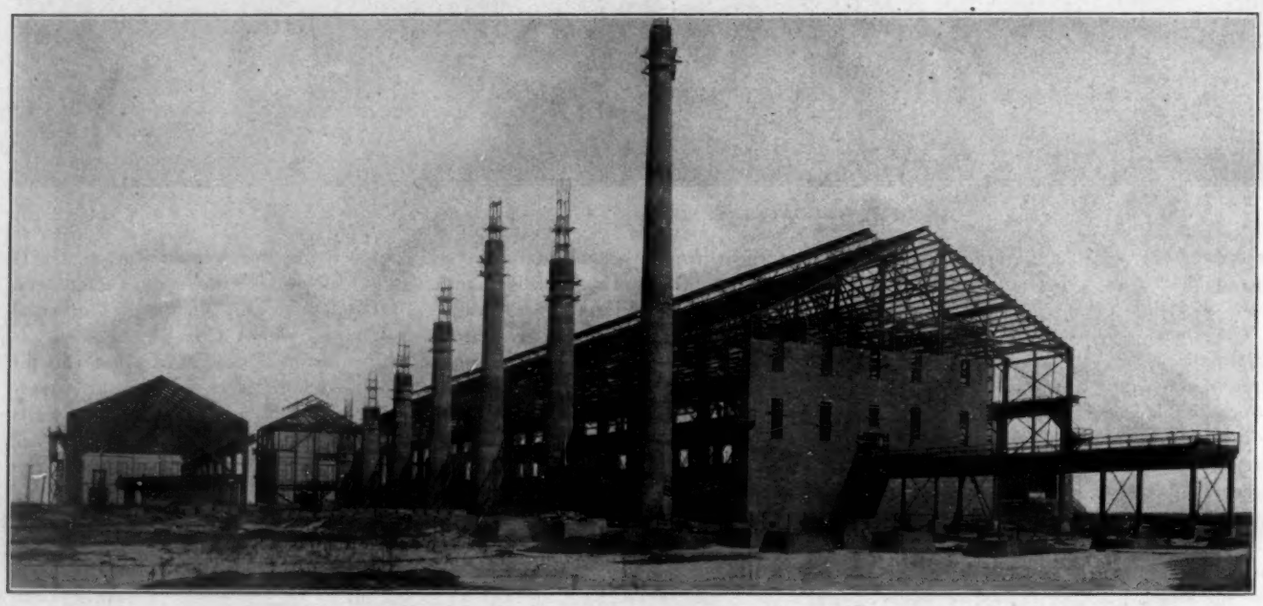


FIG. 7—OPEN-HEARTH BUILDING UNDER CONSTRUCTION

are five curing rooms, 88 feet long, each carrying two tracks. Each of these tracks will accommodate 14 large cars. A noteworthy feature here, as well as throughout the construction of the entire plant, is the use of labor-saving machinery in practically every operation.

The severe temperatures experienced in Duluth have not prevented concrete laying throughout the 12 months of the year. In cold weather the aggregates are warmed and hot water is used for mixing. Special precautions are taken to protect the freshly-laid courses from frost. Only a few years ago the general belief prevailed that concrete work could not be carried on successfully in cold weather, or at freezing temperatures; but the reward of intelligent investigations and experimentation is well illustrated by the excellent results secured on this work. There are other successful methods of mixing and placing concrete in cold weather.

Over 150,000 barrels of Universal Portland cement will be used in that part of the steel plant now nearing completion. The work is being carried out by the Minnesota Steel Co.'s own force under the general charge of K. C. Hoxie, chief engineer.

The Detroit Seamless Steel Tubes Co., Detroit, manufacturer of boiler tubes, automobile axle and mechanical tubing, is installing a tube rolling mill, which will mark a distinct advance in seamless steel tube practice

FIG. 8—MASSIVE CONCRETE SPRING HOUSE

Burning Pulverized Coal

It is about 10 years since the American Iron & Steel Mfg. Co., Lebanon, Pa., commenced the experimental use of pulverized coal in its metallurgical furnaces. From the first it was apparent that successful use of this form of fuel depended upon the absolute control of the feed to the burner. After considerable experimentation, a suitable feeding device was developed and at the present time the company is burning pulverized coal in over 100 furnaces of various types. The fuel is pulverized so that over 80 per cent will pass through a 200-mesh sieve. The burners feed from 40 to 900 pounds of coal per hour, depending upon the amount of heat required. Experiments made last spring indicate that from 1,169 to 1,472 pounds of coal are required to produce one ton of puddle bar from gray forge pig iron. The coal is conveyed automatically from the car to the pile, from which it is taken by screw conveyors to the dryers and pulverizers. As the coal leaves the pulverizer plant it is weighed on a large automatic scale. Screw conveyors are also used for conveying the pulverized fuel to the various points of consumption.

A tank or hopper of sufficient size to carry about 15 hours' supply of pulverized coal is attached to each of the furnaces. On several occasions the fuel has ignited in these hoppers, usually on Monday morning, when it has had time to accumulate moisture. In such cases it is only necessary to stop the supply and to feed the burning coal into the furnace until the hopper is empty. There is no danger of explosion under these conditions.

The fuel should be delivered to the puddling and heating furnaces at a low air pressure. From four to six ounces of blast pressure is used to deliver the coal through a small pipe to the large blast pipe, which in a heating furnace is from 10 to 14 inches in diameter.

In 1907 the average quantity of unpulverized coal required to produce a ton of puddled bar was 2,052 pounds; in 1908 it was 2,034 pounds. Tests made in 1913 indicated that from 516 to 570 pounds of pulverized coal are required for heating one ton of iron in the piling furnaces. The records of the company show that the cost of preparing pulverized coal in 1912 was slightly over 60 cents per ton, including transmission through pipes to the furnaces. If the cost of transmission is separated from the actual preparation of the coal, the cost of the latter would be less than 40 cents a ton.

The experience of the American Iron & Steel Mfg. Co. has been so satisfactory that it is now largely increasing its installation for burning powdered coal and is making arrangements to apply it to open-hearth steel furnaces without checker work.

Machine-Hour Cost Accounting

Discussion of the cost system problem with special reference to machine shop operations

By Clinton H Scovell[1]

THERE is more reason now than at any time for many years why American manufacturers should consider most carefully the problems of finance and management of their business undertakings. Facing the prospect of increased foreign competition in some lines, and the tendency towards higher wages which inevitably follows the increased cost of living, manufacturers necessarily are interested in any ways or means to make their industrial operations more efficient.

Many things contribute to the efficiency of shop management. When a business is small, its success usually depends on the ability, foresight and good judgment of one or two energetic men. As the business grows, methods and system must more and more take the place of the manager's personal oversight, and the need increases for accounting sound in principle and simple in operation.

Influence of Scientific Management

Under the influence of the new science of management, there has been a constant study in the last few years of manufacturing methods, operating standards, cutting speeds, etc., resulting many times in such marked increases of production that the management may be sure that an improvement has been made, even if they do not know exactly *how much* saving has been effected.

It has been clearly established, however, that the cheapening of manufacturing operations which is brought about by a better operating practice is frequently secured at a considerably increased cost for office force, planning departments, helpers, supervision and other indirect labor, sometimes wrongly called non-productive. As a result the practical problem for the manufacturer is to compare the lessened direct cost for labor and equipment with the increased cost for the other factors. This he can do only when he has an adequate cost accounting practice.

It is my purpose to point out the essentials of a cost system for a machine shop, or a manufacturing plant where the operating conditions are similar, with especial reference to the theory and practice of a machine-hour rate.

Good cost accounting depends on the correct application of a few well understood principles. The first is to have the direct charges from the original sources, that is, pay-roll and material distributions, correctly classified between direct and indirect costs, and then to determine how the indirect, or so-called non-productive charges, may be identified with the product.

Any cost accounting practice worthy of the name should record accurately the direct labor costs. In a machine shop, or under similar conditions, this direct labor cost should be applied with precision to each job going through the shop. *Very little cost accounting practice, however, has attained any similar precision for distributing the indirect charges for equipment, referred to hereafter in this article as burden.*

As the difficult and important part of cost accounting is to determine how a correct distribution of burden may be accomplished, it is clearly worth while to consider briefly the elements of burden.

It is a tedious and expensive undertaking to build and equip a new plant, and to complete the cycle of manufacture from design to finished product; and there is much to gain in the way of a clear understanding of costs, if we trace out this development, step by step, taking careful note of the elements of the problems as we proceed.

When a new industry is to be established, the directors first buy a parcel of land suitable for the location of the proposed shop. If the purchase price is $40,000, the new enterprise has at once absorbed capital that should earn about $2,000 to the ordinary prudent investor, who takes no manufacturing or trading risks. A site as costly as this is probably situated in or near a city, so that it will be subject to taxes of $500 or $600.

Shop buildings are next erected at a cost, let us say, of $200,000 more. This outlay of capital, like the investment in land, involves an annual interest charge of some $10,000, and under present laws, an annual penalty of some thousands of dollars more for taxes. But, unlike land, the buildings will require constant repairs; even then they are subject to a slow, but certain deterioration and obsolescence that must be met by a charge for depreciation. To protect the investment, the owners must pay insurance and provide watchmen. To make the buildings usable, they must be heated and lighted, supplied with water and fresh air, and regularly cleaned. The striking thing about these charges is that they all go on without any abatement, unless the shop is shut down, dark and cold, and even then the principal charges—interest, taxes, insurance, repairs and depreciation—abate scarcely at all.

All of this expense has been incurred by the management to provide suitable areas for the intended manufacturing process. If there are five or six subdivisions, each one may occupy an entire small building, or all or part of a floor in a larger building. Whatever the details, each uses so many hundred square feet of floor space and must carry its proportionate share of the land and building charges already described.

Different Equipment

Within a department there may be one or more different operations, such as milling, grinding, boring, turning, planing, fitting and assembling. The equipment in each case represents an investment of capital; it requires the payment of taxes and insurance; it suffers depreciation even more rapid than the building, and it incurs charges for power, repairs and such indirect items as superintendence, inspection and helpers' services. If the shop shuts down, the power may be shut off and the foremen dismissed; but so long as it runs, however short handed, or however inefficient, these charges do not change materially; and the fundamentals of interest, taxes, insurance, etc. (with the possible exception of repairs), are not one less.

All that has been described so far is overhead expense, more properly termed *burden,* and does not include any labor applied directly to the product.

This great accumulation of burden *represents manufacturing capacity* Each department, and each separate machine tool has a known annual burden. Its cost per hour is determined by dividing the total burden by the hours in the working schedule, and

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[1]Clinton H. Scovell Co., Boston.

Presented before the National Tool Builders' Association.

the shorter the schedule, the greater the hourly cost.

Having completed the buildings and installed the equipment, the management is ready to begin manufacturing operations. As the several parts of the machine progress from rough castings or forgings to finished pieces ready for the assembling floor, their value has increased as they have absorbed the successive increments of direct or productive labor, and of the burden pertaining to the production centers through which they have passed.

Before illustrating the practical application of this theory, I want to point out that good cost accounting is a help to efficient management, not only as it traces and records values, but also as it may be made a powerful agent for production control. From my experience in professional service for industrial plants, I emphasize more and more the practical value of this second aspect of the work.

It follows, therefore, that the first step in planning a cost accounting practice for a machine shop is to consider by whom and how authority to manufacture shall be made. It is simple enough to order ten castings from a given pattern which has already been made, but the production of a machine tool involves orders for castings of many different patterns and sizes, bar stock for forgings, etc., and these material orders are all simple in comparison with the complex schedule of machine operations which are required to produce the finished parts. All recognize how important it is that parts should be made in quantities that are economical and that the different pieces required should all be ready together on the assembly floor. It is, therefore, of the utmost importance to make effective plans to initiate and control the production so that these results may be accomplished. The management will then have a definite schedule of manufacturing operation on which costs may be determined by orders, by lots, by individual parts—with as much or as little detail as may be necessary.

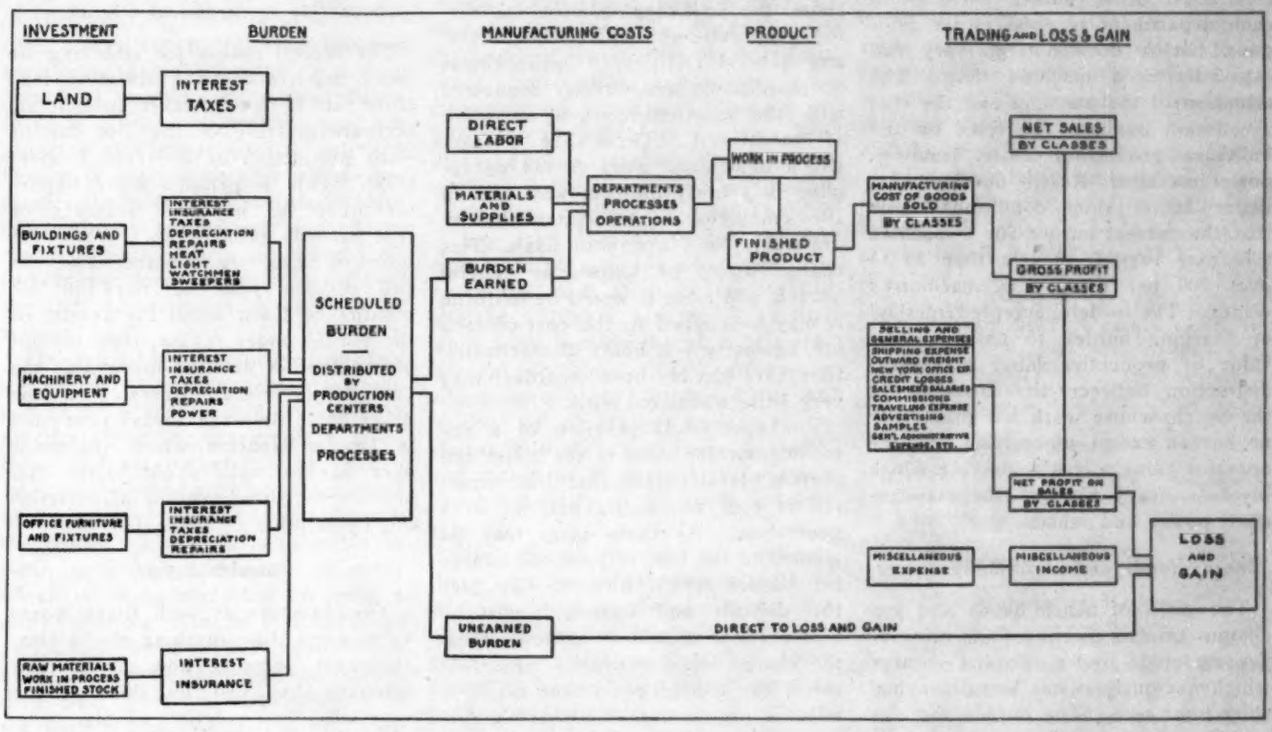
Returning to the subject of specific costs, the first step is to provide such labor records, preferably with good automatic time stamps, as will make possible the necessary distinction between direct and indirect operations, and the exact time devoted to each lot of material or each expense order.

The next step is to compute the burden correctly for each department, including interest, taxes, insurance and depreciation on the buildings and equipment, and the additional charges for power, supervision and repairs. In many industrial plants *manufacturing expense* includes only part of these charges. The first cost of manufacturing is plant investment—land and buildings. No management using a rented plant would think of omitting rent from overhead charges. When the manufacturer becomes also a landlord, as when the plant is owned by the manufacturing company, what sound reason can possibly be given for omitting from burden the charges which the management incurs in lieu of rent.

The equipment presents a slightly different problem. Few manufacturers operate with rented equipment; if they do, there is rent to pay, as an unavoidable burden on the manufacturing operations. When the equipment is owned, the maintenance charges are equally unavoidable. The manufacturer must get interest on his investment before he has in any sense a profit, and he must bear the expense of taxes, insurance, depreciation and repairs. Although these elements of cost may be neglected, or not stated, they are, nevertheless, taking their proper share, or more, of what is figured without them as gross profits.

The weakness of many cost systems is that important elements of indirect cost are thrown together in a *general expense* account, concealing the leaks and wastes that reduce efficiency and curtail profits. Many manufacturers have no doubt been satisfied to handle burden in vague and general terms because they did not know any better way to dispose of it.

It may be stated confidently that under ordinary machine shop conditions, no accurate distribution of burden can be accomplished, and, therefore, no accurate costs determined, by spreading the burden over all the


INVESTMENT
BURDEN
MANUFACTURING COSTS
PRODUCT
TRADING AND LOSS & GAIN
LAND
INTEREST TAXES
BUILDINGS AND FIXTURES
INTEREST INSURANCE TAXES DEPRECIATION REPAIRS HEAT LIGHT WATCHMEN SWEEPERS
MACHINERY AND EQUIPMENT
INTEREST INSURANCE TAXES DEPRECIATION REPAIRS POWER
OFFICE FURNITURE AND FIXTURES
INTEREST INSURANCE TAXES DEPRECIATION REPAIRS
RAW MATERIALS WORK IN PROCESS FINISHED STOCK
INTEREST INSURANCE
SCHEDULED BURDEN — DISTRIBUTED BY PRODUCTION CENTERS DEPARTMENTS PROCESSES
DIRECT LABOR
MATERIALS AND SUPPLIES
BURDEN EARNED
UNEARNED BURDEN
DEPARTMENTS PROCESSES OPERATIONS
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MANUFACTURING COST OF GOODS SOLD BY CLASSES
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SHIPPING EXPENSE OUTWARD FREIGHT NEW YORK OFFICE EXP. CREDIT LOSSES SALESMEN'S SALARIES COMMISSIONS TRAVELING EXPENSE ADVERTISING SAMPLES GEN'L ADMINISTRATIVE EXPENSE, ETC.
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GROSS PROFIT BY CLASSES
NET PROFIT ON SALES BY CLASSES
MISCELLANEOUS EXPENSE
MISCELLANEOUS INCOME
LOSS AND GAIN
DIRECT TO LOSS AND GAIN

DIAGRAM OF TYPICAL ACCOUNTS FOR A MANUFACTURING BUSINESS

work done in the shop as a percentage of the cost of direct labor. In the shop proper, with its widely varying equipment of machine tools, distribution on the basis of a man-hour rate is not very much better, although, as I shall point out later, that plan works very well for fitters and assembly men.

To secure a correct burden distribution it is only necessary to prove, by analysis, the elements of which it is composed and then to consider how all this overhead is actually applied to the product.

The Production Center

At this point we encounter another mistaken tradition of *departmentalized costs.* To define burden correctly in each department is good as far as it goes, but it does not go very far, especially in a machine shop. The attention of the manager and the cost accountant ought to be fixed on the individual production center, usually a power machine. Recent developments under actual shop conditions show that the correct burden for a machine tool may vary from less than 10 to over 300 per cent of a machinist's wages. The widely accepted method of charging burden to costs on the value of productive labor makes no distinction between the mechanic at the bench, whose work has practically no burden except supervision, and the operator using a costly machine, which involves heavy charges for maintenance, power and repairs.

Bench Hands and Assembling Crews

The work of bench hands and mechanics on the erecting floor must be accompanied by a burden charge which obviously is not literally a machine-hour rate. The burden rate for bench equipment differs not at all in principle from the rates for the machine tools. If, as is usually the case, the mechanics at the bench work under substantially uniform conditions a uniform rate may be made at so much per hour for the use of the accommodations which they require for their work. In a large shop the bench rate might be different in different departments. Since it is uniform for all mechanics who work at the bench, it is practically a man-hour rate. It must be borne in mind, however, that it is a rate for the use of equipment only, unless indeed the circumstances make it convenient to merge the cost of supervision with the cost of equipment.

The erecting hands in a shop present a problem of a different kind. Their work usually requires a considerable area, and important charges for crane service and supervision. To speak of this work in terms which have long been familiar in cost accounting practice, the erecting floor may be considered as a department whose burden is to be distributed with reference to the work performed by the mechanics employed in the department. Probably the best way to distribute this burden is on a man-hour rate derived by dividing the total annual burden by the number of man-hours for the department.

There are other charges connected with the management of a machine shop or manufacturing plant which are not necessarily well expressed through an hourly equipment rate. Such are charges for the drawing room, the bookkeeping, cost accounting, supervision, liability insurance, and general charges of management not specifically and directly connected with the maintenance and operation of machinery. These are charges which in a small shop should be applied in a fairly uniform way over all the employes in the establishment, preferably on a man-hour basis. This charge would be known as general burden, and since it would be uniform, it may be applied to the cost of each job, against which hours of mechanics' time have already been recorded, with very little additional work.

The successful operation of a scientific machine rate is the most important development that has occurred in cost accounting practice in a generation. As these rates may be applied to the cost of jobs, the charge for burden which hitherto has been the difficult and uncertain part of cost accounting will be as accurate as the charge for direct labor. Furthermore, the use of equipment rates, in effect a precision method for the important part of overhead expense or burden, requires no more work in a cost office than the application of a rate which contains only part of these charges.

There are two good reasons for saying that a scientific machine rate is a development of tremendous importance in cost accounting practice. The first is that referred to previously, namely, that it is essential when scientific management is introduced that there should be an *exact* measure of the saving which is effected by it. The literature on this subject has not thus far made a sufficient recognition of the very important fact that if an operative reduces the time on a given job from ten to seven hours, for example, he has not only saved three hours at his wage rate, but also three hours at the rate for the machine tool which he has used, and three hours of general burden.

Cost accounting practice which analyzes burden charges would naturally make a precise account of the increases in overhead expense of any kind. In some cases in connection with the introduction of scientific management, these increases would be in a particular department, and would operate to increase the burden which would be disposed of as a machine-hour rate for the tools in that department. Usually, however, the additional charges would operate to increase the general burden, which is one of the most important and at the same time, one of the most elusive elements of manufacturing cost.

Loss Due to Inefficient Operation

The second reason for attaching so much importance to a scientific machine rate is that it makes possible an accurate measure of the loss due to slack production or interrupted operation. This is perhaps more important than the improved accuracy of cost records referred to. When the board of directors is gathered at the end of the year, or once in six months, to learn about the results of the period under review, they do not often consider detailed matters as the cost of individual orders. On the other hand, they are always interested in any explanation which the manager has to make about losses that are due to curtailment of manufacturing operations.

Valuable Reports

The directors at such times would value more than anything else a clear statement showing how much their company had lost on this account, especially if the details of the statement could be readily understood and readily proved by an analysis of the operating conditions. The big problems in regard to manufacturing which the directors have to settle are to make an efficient use of plant and equipment, especially if they are asked to decide on new additions to meet a probable volume of business. The new plant means an added investment, and if it is of the utmost importance that the account should subsequently show to what extent this investment was utilized.

It is essential to distinguish clearly between losses or gains on machines actually made and sold and losses due to slack production or inefficient use of equipment.

It must be borne in mind that the finished product has absorbed only the burden of the equipment actually

used in its manufacture. It has not absorbed the burden of unused equipment or idle machinery. If the plant includes a foundry and the management decides to purchase castings, the idle foundry has contributed nothing to the product. It is obviously unfair to charge into the cost of goods the burden charges on automatic machinery that may be idle because the management is buying and not making machine screws. If only three-quarters of the lathes run, the idle remainder have not helped machine parts actually manufactured, and although the plant may go into bankruptcy if it cannot utilize its equipment, the cost of the work actually done is not greater on that account.

The burden on idle machinery is no more a part of the cost of manufacture, unless due to enforced seasonal variations, than the burden on a shop owned by another corporation. When there is a proper distribution and application of expense burden, only the burden is charged to cost which represents the equipment utilized in manufacture, and burden not applied remains as a balance to be charged direct to the loss and gain account at the end of the month, six months or a year.

This is readily accomplished through the means of burden accounts which collect, by a very simple bookkeeping practice all of the charges in a given class, and receive credits as burden rates of the same kind and are charged to the cost of product going through the works. The unearned burden in some cases may indicate an error which is to be corrected by using a more accurate rate in a subsequent period, but when proper records have been established, the unearned burden is a clear loss, and the balances of the burden accounts should be transferred directly to the profit and loss accounts.

Effect on Sales Policy

If the distinction is maintained between losses or gains on goods made and sold, the losses due to restricted output, the management will consider sales policies in a much more certain way than is ever possible when the facts are obscured in the haze of average costs, calculated in varying volumes of product. In respect to burden it is frequently true that costs figured as averages vary beyond all hope of comparison as the volume of output goes up or down.

Whatever the effect on sales policy, good cost accounting, including correct burden distribution, is a matter of enduring importance from the point of view of manufacturing. Changes in volume may completely obscure gains or losses in efficiency, and render comparative costs in similar jobs impossible from season to season, solely because of the variations in the amount of business done. Exact costs, comparable under all conditions, are not to be secured unless the burden charged to production is only that pertaining to the equipment that is actually at work.

Idle Equipment

From the manager's point of view, the significant fact is that burden, which it is proposed to apply through a series of equipment rates, is not appreciably less when the operating schedule of the plant is reduced. It is true that power charges may be slightly less, but the fixed charges for building space, interest, insurance, taxes, depreciation, and under some circumstances for repairs also, are no less when the machines are idle. The manager of a machine shop cannot make a greater mistake in figuring costs than to charge a higher burden in any form whatsoever for the operation of part of his equipment, because the rest of it is temporarily idle, or a higher rate for a smaller labor force because the plant is working on part time. These differences which have always attracted the attention of observing managers are almost entirely clear loss or waste, and should be recognized as such and charged directly to the profit and loss account.

The practical manager who regards these ideas as too theoretical will do well to inspect the following list which shows the results of working out a machine-hour rate for direct operating burden in a plant operating about 150 machines:

No. of Machines	Rates in cents	No. of Machines	Rates in cents
6	1.5	2	14
4	2.0	11	15
9	2.5	1	17
4	3.0	3	18
6	4.0	1	19
2	5.0	1	20
4	6.0	1	22
10	6.6	4	23
12	7.0	3	24
12	8.0	2	25
7	8.7	1	26
4	9.0	1	29
3	9.5	2	30
10	10.0	1	47
3	11.0	1	52
13	12.0	1	76
2	13.0		

If one is disposed to criticise the minute division that has been made, such as having rates at 8, 8.7, 9, 9.5 and 10 cents, it should be borne in mind that there is practically no more work in the cost accounting department in using five rates instead of two. Moreover, if an effort is made to combine some of these rates, it is exceedingly hard to say which rates should be raised and which should be lowered. If five rates like those mentioned should be brought together, some of the rates will be at least 15 per cent out of the way. Such an error is altogether too large to be tolerated unnecessarily, when one is seeking for really accurate costs.

At the plant where these rates are in force the burden for erecting hands, including the charges for floor space, crane service and supervision, was five times the rate for bench hands. In addition to these rates, every employe participates in a general burden which includes superintendence, managers, drafting, cost accounting and all general charges, except those connected with selling expenses.

The results which have been secured in working out these machine rates need only to be stated to a practical man to show the violent inaccuracy which there must have been in cost accounting when overhead charges were applied as a percentage of productive labor, or even on a uniform man-hour basis. The following figures will supply a vivid illustration of the inaccuracy of the old method:

Job No. 1.

5 hours labor at 28 cents	$1.40
5 hours burden on the average plan at 30 cents	1.50
Total cost	$2.90

Job No. 2.

5 hours labor at 28 cents	$1.40
5 hours burden on the average plan at 30 cents	1.50
Total cost	$2.90

Comparison of Methods

At the same wage rate the two jobs show the same cost because they took the same time, although job No. 1 may have used a machine worth 3 cents per hour and job No. 2 a machine worth 24 cents per hour, or even one worth 50 cents per hour or more. Under these conditions, and assuming a general burden rate of 10 cents per hour, the true cost of these two jobs was as follows:

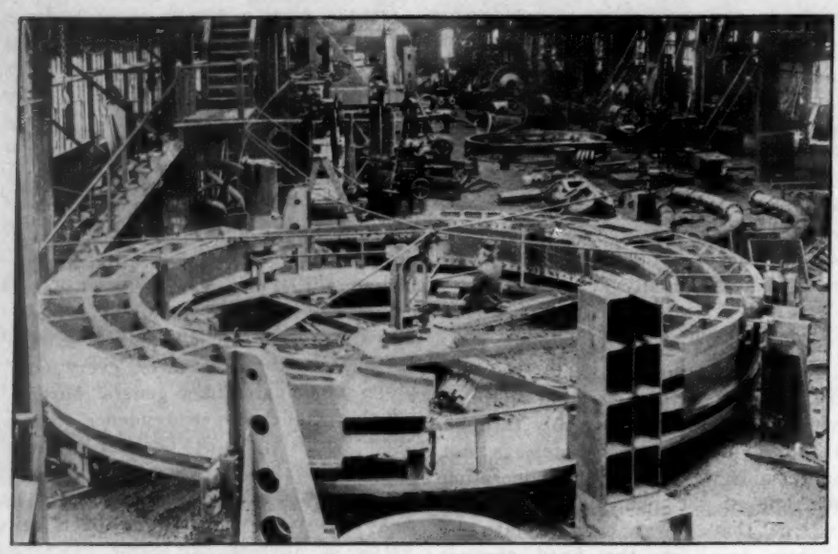
Job. No. 1.

5 hours labor at 28 cents	$1.40
5 hours machine rate at 3 cents	0.15
5 hours general burden at 10 cents	0.50
Total cost	$2.05

Job No. 2.

5 hours labor at 28 cents	$1.40
5 hours machine rate at 24 cents	1.20
5 hours general burden at 10 cents	0.50
Total cost	$3.10

This is a conservative comparison. If job No. 2 required a machine worth



MILL WHICH TURNS CASTINGS 40 FEET IN DIAMETER

60 cents per hour, the cost would have been $1.40 + $3.00 + $0.50 = $4.90. The percentage on labor method, or a straight man-hour rate in the ship, would show that these three jobs had the same cost, although as a matter of fact in the second case the cost was 151 per cent and in the third case 239 per cent greater than the first.

Perhaps the best thing that can be said about cost accounting practice by machine-hour methods is that it does not require any more work than any of the older methods that have been well developed as a means for taking out costs. At the plant from which the above illustration is drawn, it is not expected that there will be any increase in the cost accounting force for the operation of the plan as outlined. Of course, if a plant with an under-developed cost practice, or none at all, starts to make improvements in a wholesale way, they must expect to increase their overhead charges. If this increase is wisely planned, it is sure to be a money-making expenditure.

Mass Production

As noted previously, there are some conditions, of course, under which a machine rate cannot be used to distribute burden, but the underlying principle of collecting all burden charges for each production center is sound, whatever method may be used for distribution. Some operations can best use a process rate, which includes labor and accessory supplies as well as burden. This method is particularly applicable to mass production, or any work that is not made on successive and clearly distinguished manufacturing orders. The application of overhead charges, however, can be made through a process rate strictly in accordance with approved principles of burden distribution.

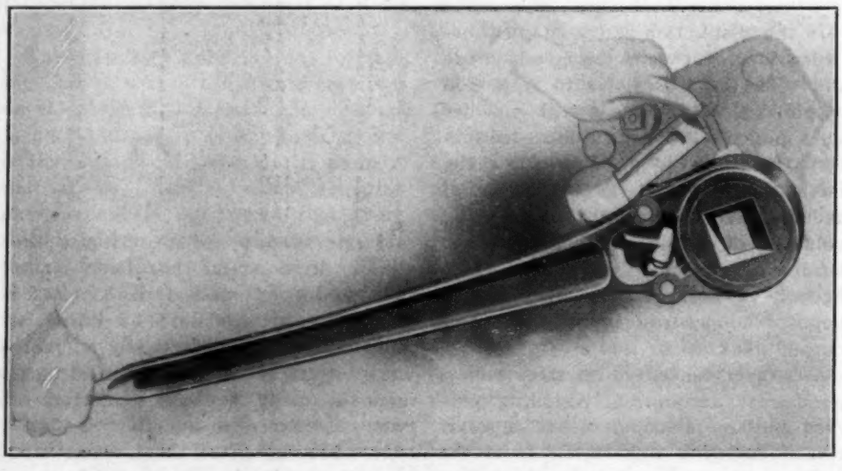
Automatic or semi-automatic machines present a troublesome problem of burden distribution, especially as the burden is usually far more important than the labor as an element of manufacturing cost. This problem has been handled at a plant operating several hundred automatic machines by a plan of efficiency charts which provide for charging to the job the cost of the effective operation of the machine. Cost accounts under this plan measure with great precision the loss due to slack production or careless attention from the operator.

Forty-Foot Boring Mill

The Pennsylvania Engineering Works, New Castle, Pa., has recently constructed a large boring mill for turning rockers for metal mixers which this company builds. Although the mill is comparatively simple in construction, it is said that it can turn accurately up to 40 feet in diameter. The table is 30 feet in diameter and is driven by a rack which has a pitch diameter of 24 feet 10 inches. The tools are arranged so that five heavy cuts may be made at one time. The whole machine is centered on a large pintle on which an automatic feed is mounted. This mill is designed to handle work ranging from 24 to 40 feet in diameter and is not intended for turning smaller castings. In the accompanying illustration, the mill is shown turning a 30-foot rocker band for a 600-ton metal mixer which was shipped to the Pittsburgh Steel Co. Each of the two castings weighs 59,500 pounds, the width of face being 30 inches. The rockers are eccentric, that is, they are turned to an outside diameter of 30 feet and bored to 30-foot inside diameter. The boring operation was accomplished by supporting the rockers on parallels outside of the mill, the cutting tools being attached to the mill table.

Ratchet Wrench

A ratchet wrench for opening the hoppers of drop bottom or side dump cars, which aims to combine convenience with safety has recently been developed by the Hess Steel Castings Co., Philadelphia. The details of the tool are shown in the accompanying illustration. The top pawl is automatically thrown to safety when the wrench is lowered sharply, so that it is impossible for the operator to be caught. The wrench is sufficiently strong to make unnecessary any manipulation on the part of the operator to force open the door in case it should stick. With this wrench, it is claimed that a hopper car door can be safely opened by one man. The wrench socket is designed to conform with the requirements of the Master Car Builders' Association.



SAFETY RATCHET CAR WRENCH

Floating Cranes for the Navy

The Wellman-Seaver-Morgan Co. has built two 150-ton cranes with Busch-Sulzer Diesel engines

THE Wellman-Seaver-Morgan Co., of Cleveland, recently constructed two 150-ton floating cranes of exactly similar type, equipped with Busch-Sulzer Diesel engines for the bureau of yards and docks, United States navy, one for the Boston navy yard and the other for the Pearl Harbor naval station, Pearl Harbor, Hawaii.

These pontoon cranes consist essentially of a bridge type superstructure, mounted on a steel pontoon, the cantilever arms of the superstructure extending beyond the ends of the pontoon a sufficient distance to give a hook travel of approximately 64 ft. beyond each end of the float.

The superstructure is rigidly connected to the pontoon and the trusses carried by the supporting legs are approximately 290 ft. overall, supported by shear legs forming a center span of 115 ft. These shear legs are substantially braced in order to take the end load due to the fore and aft list of the pontoon. The legs are of sufficient height to give a maximum hoist of the main hooks of 70 ft. above the top of the deck and sufficient hoist rope is allowed so that these hooks may be lowered 25 ft. below the deck of the pontoon. The bridge trusses are four in number and arranged so that an auxiliary trolley, having a capacity of 15 tons, travels on rails between the two center trusses. Between the center trusses and the outside trusses a 75-ton trolley is carried on rails on each side. The extreme travel of the main trolleys is approximately 251 ft. from one end of the truss to the other. Each of the 75-ton hook blocks supported by the main trolleys is carried on a double 4-part hoisting rope 1⅝ in. diameter. These ropes are equalized at one end and are wound upon drums which are located in one of the machinery compartments in the pontoon, as will be described later. The 15-ton hook block is supported by four parts of cable which is also wound upon a drum in the machinery compartment in the pontoon.

The pontoon is of steel construction throughout, having a moulded length of 125 ft., moulded breadth of 70 ft. and a moulded depth of 14 ft. This pontoon is divided into 26 watertight compartments, being provided with collision bulkhead running fore and aft 5 ft. from each side of the pontoon, and a water-tight bulkhead fore and aft through the middle, extending the entire length. Transverse bulkheads are arranged forming two machinery compartments amidships, one on either side. These compartments are approximately 43 ft. long and 30 ft. wide. Water-tight compartments also form four full-depth counterbalance tanks approximately 15 ft. square at each end, these tanks being used to counterbalance the pontoon when lifting the maximum load at the extreme end of the cantilever arm. The machinery compartments are provided with inner bottoms 4 ft. deep. Power for operating this crane is supplied by means of a triple cylinder Diesel engine, made by the Busch-Sulzer Bros. Diesel Engine Co., St. Louis, direct connected to a 100 k. w., 220-volt, direct current generator. Each of the cylinders is 18 in. in diameter and the engine has a stroke of 24 in. and is rated at 225 h. p.

In addition to this source of power there is also installed on the pontoon an Edison storage battery having a capacity of 600 k. w. hours, which may be used in case of emergency. There are two separate sets of mechanism for operating the 75-ton hooks and these mechanisms are so ar-

FIG. 1—HONOLULU FLOATING CRANE

FIG. 2—DIESEL ENGINE BUSCH-SULZER TYPE

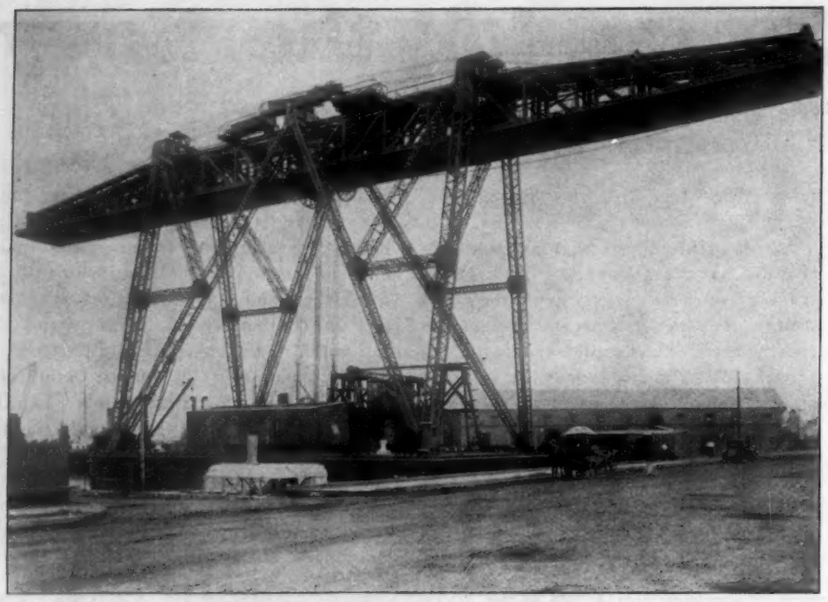


FIG. 3—SIDE VIEW OF HONOLULU CRANE

ranged that they may be clutched together when using the two trolleys for the maximum load of 150 tons. Each 75-ton winding drum is geared to a 60 h. p. motor, and arranged to hoist its load of 75 tons at the rate of 8 ft. per minute. Change speed gears are also introduced into this mechanism so that the empty hook can be hoisted at the rate of 100 ft. per minute. This mechanism is located in one of the machinery compartments of the pontoon and in the same compartment is also located the machinery for traversing the 75-ton trolleys. Each of the trolleys is provided with a separate winding drum which is operated by means of a 37½-h. p. motor, and the arrangement of the separate mechanisms is such that they can be clutched together when using the two trolleys at the same time for the maximum load. The gearing of the trolley mechanism is such that the trolleys under full load can be traversed across the bridge at 50 ft. per minute. In this compartment are located the magnetic control boards for the motors.

In the other machinery compartment with the engine generator set is located the machinery for the auxiliary hoist and trolley. The auxiliary hoist drum is geared to a 60-h. p. motor of a duplicate type of those used for the main hoist. The gearing of this mechanism is such that a 15-ton load can be hoisted at the rate of 35 ft. per minute. Change speed gears are also introduced into this mechanism so that the empty hook may be hoisted at the rate of 100 ft. per minute. The auxiliary trolley travel drum is geared to a 37½-h. p. motor. The gearing of this mechanism is such that the auxiliary trolley can be traversed across the bridge at a speed of 200 ft. per minute.

The counterbalance pump is also located in this machinery compartment. This pump is of centrifugal type, having a 10-in. suction and a 10-in. discharge and is connected to four 8-in. manifold pipes at each end for filling and emptying the water ballast compartments. This pump is driven by a 25-h. p. motor and has a capacity of 2,500 gallons per minute. The suction and discharge valves for regulating the direction of flow into or out of the counterbalance compartments, are controlled by levers in the operator's cab, which is located on top of one of the machinery houses, as shown in the accompanying photographs. The pump is also used for draining all compartments by 2½-in. bilge piping leading from a manifold to each of the watertight compartments of the pontoon.

Simple Control

Four electrically-driven capstans are located on the deck of the pontoon, these being separately operated by four 25-h. p. motors, operated by drum type controllers. All of the motions of the pontoon are controlled from the operator's house, located on top of one of the deck houses, as shown in the photographs. This house contains the control levers for hydraulic valves, clutches, etc., as well as the master controllers for all hoist and trolley motors and the pump motor.

Figs. 1 and 3 show the crane constructed for the Pearl Harbor Naval Station. On account of local conditions this crane was constructed at Honolulu and towed to Pearl Harbor after completion.

Fig. 2 shows the Diesel engine installed in the pontoon. Figs. 4 and 5 show duplicate machine constructed at the Boston Navy Yard. These machines are practically duplicates of each other, and have a maximum lifting capacity of 150 gross tons with the auxiliary hook, having a capacity of 15 gross tons. The purpose of these cranes is to lift guns, turrets or heavy armament to or from battleships or naval vessels, or from decks or for general dock service in connection with the navy department.

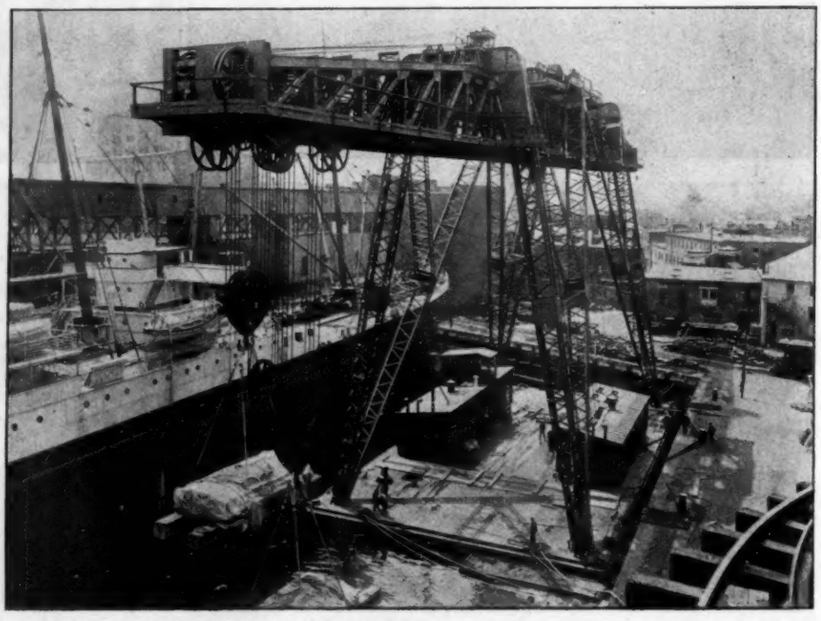


FIG. 4—BOSTON NAVY YARD CRANE HANDLING LOAD OF 150 TONS

Storing Coal

The United States Bureau of Mines recently investigated the deterioration of various kinds of coal under storage, and it was found that, while several coals evolved methane in large volumes, especially in the early period after mining the coal, the gas evolved in one year from this cause means a maximum loss in calorific value of only 0.16 per cent. The navy department tests show a loss of less than 1 per cent in a year on New River coal weathering in the open; and Pocahontas coal in a 120-ton pile on the Isthmus of Panama lost less than 0.4 per cent during one year's outdoor weathering. Pittsburgh gas coal suffered no loss whatever during six months' outdoor weathering. Wyoming coal, however, lost 5.3 per cent during two years and nine months, 3.5 per cent of which was lost in the first three months. For a distance of from 12 to 18 inches from the surface there was bad slackening and crumbling of the lumps. Illinois coal as tested by Prof. Parr, of the University of Illinois, lost 1 to 3 per cent in a year with slackening and crumbling. The average value, therefore appears to be a loss of 1 to 3 per cent of heating value in one year, a large percentage of this loss occurring within from three to six months after the coal has been placed in storage. Perry Barker, in a paper before the American Society of Mechanical Engineers, says that some results of tests on German gas coals have been given which state that these fuels have lost an average of 1.7 per cent of heating value per week, but on the basis of the American tests it is apparent that the loss in heating value is not the most serious consideration in the question of coal storage.

The danger which is to be most carefully avoided in connection with coal storage is the more rapid form of oxidation known as spontaneous combustion. Mr. Barker names the causes of spontaneous combustion as the escape of inflammable gases from fresh coal surfaces, the absorption of oxygen from the air with the production of heating, the presence of fine coal which brings large surfaces into contact with the air and so accelerates the oxidation of the whole mass, the presence of an excessive amount of moisture, and in some cases the presence of external causes of heating even if these are very moderate in amount. As regards the escape of gases he states that the results of experiments in freshly mined coal show that the loss of gases is about equal to the volume of coal, and the heating value of such gases amounts to 0.1 or 0.2 of the heating value of the coal. The point about this is not the actual calorific value which is lost, but the danger of explosion attending on the escape of such inflammable gases; while the evolution of heat accompanying oxidation is one of the great causes of danger of spontaneous combustion in coal piles. Heat from steam pipes, boiler and walls also tend to the ignition of the mass.

Various authorities have advocated means of avoiding spontaneous combustion. Summarizing various recommendations, it may be said that safety is promoted by observing the following precautions: Combustible gases should be eliminated before storage; in other words, freshly mined coal—particularly if it is gassy—is not safe for storage, and about six weeks' seasoning should be allowed after mining before storage. The storage piles should not be over 10 to 12 feet deep, and should be so disposed that any point in the interior will not be over 10 feet from the air-cooled surface. If possible, lump coal only should be stored, the removal of fine coal being effected by screening. Dust should be kept out as much as possible. The method of placing the coal in storage should be such that it is not broken up during handling. If a mixture of lump and fine coal is stored, the various sizes should be well mixed together and evenly distributed so that the formation of air passages is avoided. These very often occur if the storage pile is so formed that large lumps roll down from the peak and form air passages at the bottom. It is not wise to attempt ventilation by pipes; and care should be taken to see that there is no infiltration of air through brickwork, timber or porous foundations, such as coarse cinder. It is a useful precaution to rehandle and screen the coal after every two months. There is great danger of gas explosion as well as spontaneous combustion if powdered coal is stored. Fine coal, if required, should be pulverized immediately before use in the furnace and at the rate required at the time. Weather conditions should be guarded against where the coal is subject to wetting and drying. For example, a bad storage would be one in which the rain can fall on the pile and be subsequently dried off by the sun or the warmth from steam pipes. External sources of heat, even moderate in degree, should be carefully kept away from the coal pile.

Heating extending to spontaneous combustion, it is maintained, can be eliminated by submerged storage. It is stated that in cases where coal has been stored under water in concrete tanks of considerable capacity the practically negligible loss in calorific value thus obtained considerably more than counterbalances the increased amount of moisture in the coal as fired to the boiler furnace, and such submerged storage renders spontaneous combustion impossible. Moreover, the result is obtained regardless of the size of the coal stored. A large Chicago manufacturing firm employing this method has found that with Illinois coal ranging from dust up to about 1 1-4 inches lumps the method works satisfactorily. The fuel, after being loaded out for storage, is allowed to drain for a few hours before passing to the chain-grate stokers with which the boiler furnaces are fed. It is stated that the cost of handling coal in a scheme of this sort should not

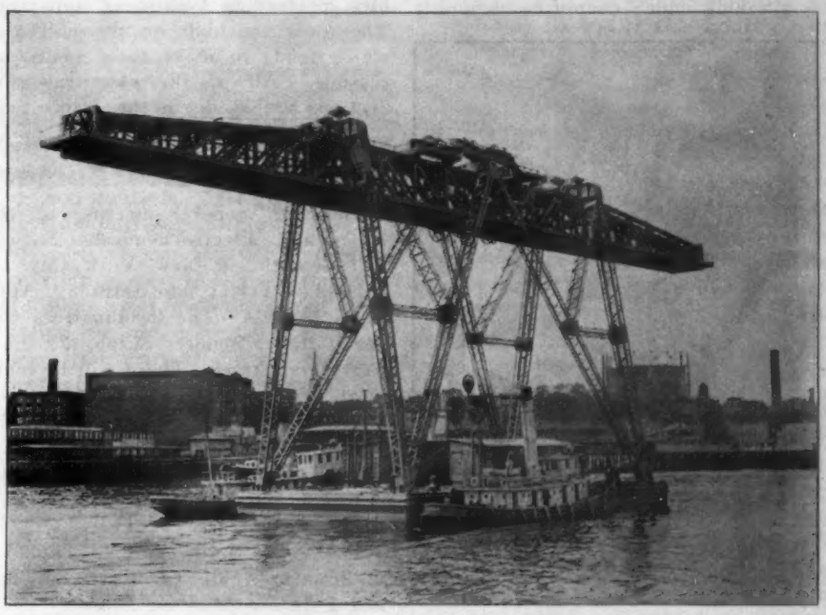
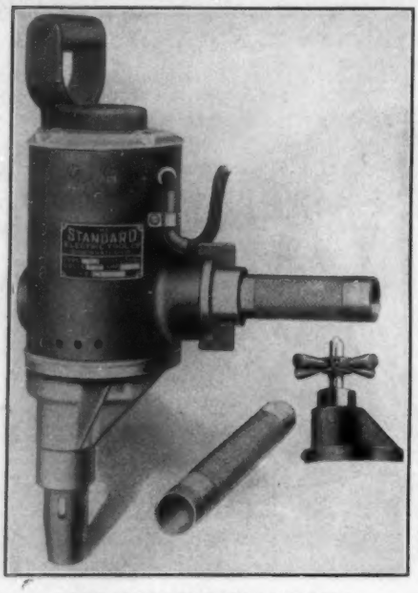


FIG. 5—QUARTER VIEW OF BOSTON NAVY YARD CRANE

be more, and may be distinctly less, than when it is piled upon the ground in the open air. Mr. Barker refers to a method which has been recently adopted in order to reduce the amount of contained moisture in coal storage in permanent contact with water. This is by only partially submerging the coal; and it is stated that the exposed portion of the coal pile absorbs a sufficiently high percentage of moisture through capillary action to prevent any danger of serious oxidation.

Concrete Construction

Recent investigations by the Aberthaw Construction Co., Boston, indicate that a decided reduction has taken place since July, 1913, in the cost of concrete construction. In addition to a direct saving in materials, there is a saving which cannot be definitely



PORTABLE ELECTRIC DRILL

fixed, due to the ease with which materials may now be secured promptly, thus avoiding delays and the incidental heavy overload. Another factor arises from the ability of the contractor at the present time to put some of his picked men into the organization, thus getting better results than if he were pressed for men to finish work underway. In addition, the average contractor can now give more direct personal attention than at times when business is abundant. The three items just mentioned have been estimated by Mr. Wason, president of the Aberthaw Construction Co., at about 3 per cent on the total cost of the building. If we add to this, possibly 4½ or 5 per cent, represented by a reduction in the cost of materials, the total saving as compared with last summer is approximately 7½ per cent.

Portable Electric Tools

A line of ball bearing, portable electric grinders and drills has recently been placed on the market by the Standard Electric Tool Co., Cincinnati. They are designed to operate on both direct or alternating current up to 60 cycles and are arranged specially to meet the demand for grinders that will run satisfactorily on 25, 30 or 40 cycle circuits. The spindle speed is approximately 6,000 revolutions per minute, the motors being rated at 1/6 and ¼-horsepower, depending upon the class of work to be performed. The drills are built in two sizes, ⅜-inch and 1-inch capacity. The motors are form-wound and their coils are impregnated with an insulating compound designed to prevent grounds, short circuits and other troubles incident to high-speed apparatus. The tools are built on the unit plan which tends to make them easily accessible. All of the electrical connections are made in the frame unit.

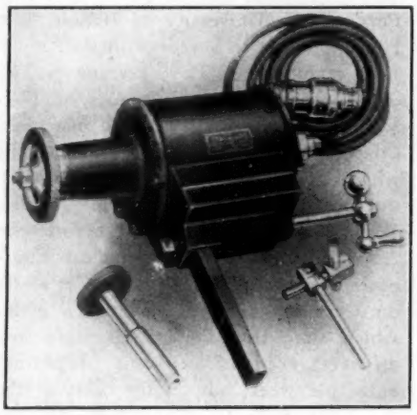
Electrochemical Society

The 25th general meeting of the American Electrochemical Society will be held in New York City on Thursday, Friday and Saturday, April 16 to 18, 1914. The headquarters will be at the Chemists' Club, 25 East Forty-first street. There will be technical sessions on the morning and afternoon of Thursday in Rumford hall in the Chemists' building, 50 East Forty-first street, and on Saturday morning and afternoon in Earl hall, Columbia university. There will be a smoker on the evening of Thursday in Rumford hall, Chemists' building, and a dinner-dance on Saturday evening, also in the Chemists' building, On Friday there will be an all-day excursion by steamboat around New York harbor and Staten Island, combined with visits to the plants of the American Smelting & Refining Co., the United Lead Co. and the Waclark Wire Co. The arrangements for the meeting are in the hands of the New York Section of the American Electrochemical Society, and the smoker on Thursday night and the steamer party on Friday are complimentary affairs tendered by the New York Section.

Willard C. Brinton will read a paper on graphic statistics for engineers and executives before the American Society of Mechanical Engineers, Tuesday, April 14. The paper describes some graphic methods not generally used by engineers but which could be of great assistance to men who must frequently condense and abstract information and write reports. Some methods are now in use by biologists and statisticians which could be applied to the work of the engineer if they were more generally understood. Most of the speaker's talk will be devoted to methods for keeping corporation operating records in convenient form for instantaneous reference.

Technical Reports

"The first thing the engineer must remember when he is retained is that he stands in a fiduciary relationship to his client. He is retained to furnish a report which is to give facts and data which will form the basis for decision as to the advisability of making an investment. The accuracy of these facts must, therefore, be unquestioned, and they must include all the available material. Moreover, since the report is usually addressed to non-technical



PORTABLE ELECTRIC GRINDER

people, the language must be clear and simple. The reader should be assumed to know nothing of the subject, and technical terms should be defined when used for the first time."

The above remarks were made by Arthur D. Little, in a recent lecture before the Chemical Society of the Massachusetts Institute of Technology. A large audience greeted the speaker because of the long and varied experience which he has had in consulting practice as a chemist and engineer. Continuing, Mr. Little emphasized the fact that an engineer's success depends on his ability to influence other men, and that therefore the cultivation of good English was an absolute necessity.

"The form of the report is extremely important. Although paper, type, and binding have nothing to do with the subject matter, they influence the reader's opinion, and should be carefully considered. The title page should

(*Continued on page* 688*b*)

Two Conventions

Will be held at Worcester—N. M. T. A. Program

The convention of the National Machine Tool Builders' Association, as well as that of the National Metal Trades Association, will be held in Worcester, Mass., this month. The National Metal Trades Association will be in session April 21 and 22, and the National Machine Tool Builders' Association on the two following days. Both organizations will meet at the Hotel Bancroft.

The meeting of the executive committee of the N. M. T. A. will be held Monday morning, April 20; the administrative council will meet in the afternoon at 2 o'clock and the alumni dinner will be served at 7 o'clock that evening. The secretaries' breakfast will be served Tuesday morning at 8 o'clock, and at 10 o'clock a joint meeting will be held of the presidents and secretaries of the various locals and the administrative council. The convention proper will open Tuesday afternoon at 2 o'clock and continue through Wednesday, ending with a convention banquet, Wednesday evening, at the Hotel Bancroft.

The address of welcome will be delivered at 2 o'clock, Tuesday afternoon, by Hon. George M. Wright, mayor of Worcester. Reports of the following officers will be received: President, W. A. Layman; treasurer, F. C. Caldwell; commissioner, John D. Hibbard; secretary, Homer D. Sayre. Reports of standing committees as follows will be received:

Industrial education, F. A. Geier, chairman; discussion by C. A. Prosser, National Society for Promotion of Industrial Education; Lewis H. Buckley and George Alden, Worcester Independent Industrial Schools; W. B. Hunter, Fitchburg Plan Industrial Education.

Prevention of Industrial Accidents, W. H. Van Dervoort, chairman; discussion by Wm. H. Doolittle, National Metal Trades Association's safety inspector; M. W. Alexander, chairman of the committee on safety and sanitation, National Founders' Association.

Publicity, Justus H. Schwacke, chairman.

Wednesday morning, the following papers will be read: "Results of Applied Scientific Management", by George D. Babcock, H. H. Franklin Mfg. Co., Syracuse, N. Y.; "Production in Its Relation to Efficiency", by Prof. Dexter S. Kimball, Sibley College, Cornell University, Ithaca, N. Y.; "Work of the Bureau of Foreign and Domestic Commerce and the Plans of the Department For Its Development", by Albertus H. Baldwin, chief of the bureau of foreign and domestic commerce, department of commerce, Washington, D. C.

Wednesday afternoon at 2 o'clock, a paper on Labor Legislation will be read by Walter Gordon Merritt, of the American Anti-Boycott Association, New York, and discussion will be opened by B. B. Tuttle, Cincinnati. Reports of committees, election of officers and other business will follow.

Strongly Favors

Quoting Scrap Gross Tons—Mr. Verner's Views

Berton L. Verner, secretary of the newly-organized Western Scrap Iron and Steel Association, Chicago, is an earnest advocate of the proposal to quote all scrap iron and steel on the basis of gross tons instead of the mixed plan now in vogue.

Mr. Verner has been actively associated with the scrap iron and steel business for several years and appreciates the difficulties which inhere in present methods. He recently expressed himself as follows:

"I certainly am in favor of reducing the scrap market to a gross ton basis, and doing away with the mixed classification we are using at present. If the eastern markets did not use gross tons entirely, it would not be so bad, but under the circumstances a broker buying in the west and selling in the east is under the necessity of translating all his tonnage from net to gross tons, except in the case of car wheels and steel rails, which are bought and sold in gross tons in the west as well as in the east.

"An effort was started some six or seven years ago to bring about this reform, but on account of the opposition by railway officials, it never made much headway. I shall be pleased to bring the matter to the consideration of the Western Scrap Iron and Steel Association, and if that body can exert any influence in the direction of uniformity, I believe it will be a distinct gain for the business. One of our purposes in organizing is to establish uniformity of customs and probably no other custom weighs more heavily in the balance than the matter of tonnage.

"The dealer in scrap in this market is compelled to convert gross into net and net into gross continually while he is dealing with a buyer or seller and is fortunate indeed if he does not quote on the wrong basis in the midst of the confusing mass of figures."

Best Attended

Meeting in history of Foundrymen's Association

The Newark Foundrymen's Association, Newark, N. J., at its meeting on April 1, nominated officers to be elected at the May meeting. The nominations were as follows: President, H. P. MacDonald, of the Snead & Co. Iron Works, Jersey City, N. J.; vice president, James Flockhart, of Maher & Flockhart, Newark; secretary, J. S. Kinne, of the Riverside Steel Casting Co., Newark; treasurer, John Campbell, of Maher & Flockhart. Nominees for the executive committee were as follows: James Flockhart; G. Hannay, of the Oscar Barnett Foundry Co., Irvington, N. J.; Arthur E. Barlow, of the Barlow Foundry Co., Newark; Dennis O'Brien, of the A. P. Smith Mfg. Co., Watsessing, N. J.; and Louis Sacks, of the Louis Sacks Iron Foundry, Newark.

J. S. Hibbs, of the J. W. Paxson Co., Philadelphia, was the speaker of the evening, discussing "General Foundry Practice". He reviewed the various materials of foundry consumption and told where they come from and how they are produced. He said that the sand deposits of New Jersey are the best in the country for foundry purposes. He discussed various kinds of facings for molds, cupola linings, etc., Mr. Hibbs believed that each foundry should employ its own chemist as a means of averting possible losses through the selection of materials. Often, he said, in turning over the selection of pig iron to a consulting chemist, the lowest priced iron would be recommended and this might not always be the best for the requirements of the foundry.

A representative of the New Jersey state chamber of commerce was present, who set forth the purposes of that organization.

The meeting was the best attended ever held by the association.

Will Meet at Hartford

Day Baker, of the General Vehicle Co., spoke before the New England Foundrymen's Association, Wednesday evening, April 8, at the rooms of the Exchange Club, Milk and Batterymarch streets, Boston, Mass., upon the subject of "Auto Trucks". The address was illustrated. The New England Foundry Association announces that the May meeting will be held in Hartford, Conn., and that the arrangements for this gathering will be in the hands of the Hartford members.

What's the Matter With Farmers?

(*Continued from page* 661)

are in the south, and during the next 10 years the south will require in way of farm tools and implements a production that will test the highest efficiency of the present manufacturing establishments.

More Publicity Needed

Another thing: Just a few years back, there were at least 2,000 manufacturers of farm implements and tools. There are now but 666. The fight for trade caused intense rivalry and competition in those older days and consequently thousands of tools and implements were sold because of this rivalry that are not sold, because that rivalry is lacking. This touches upon the fact that there is less publicity in general and less education of public interest on the part of these manufacturers, because the manufacture and sale have been more concentrated and there is less competition. Manufacturers have been led to believe that all they need to do is to lay implements down on the dealers to move and the dealers won't do it. The dealers cannot do it and they are not enterprising enough to do it. It is up to the producer to move these goods. It is up to the farm implement producers through education and publicity to create interest among farmers concerning the products they make and were they to do this as they did 15 or 20 years ago, two machines would move out of the dealers' hands where one moves now.

Implement manufacturers have also taken on new lines and they have neglected to acquaint the public about what they are producing. Go through a hardware store or a dealer's warehouse and you will be dumbfounded at the useful tools, implements and other conveniences that are there on hand which you never dreamed existed. That is the way it is with hundreds of products. They have been added as side lines and no effort has been made to acquaint the public of their existence; consequently, where they could be moved by the thousands into farm homes and on to farm establishments, they are not sold because farmers know nothing whatever about them. Farmers would buy them if they knew of them. Nine dealers out of ten wait for purchasers to come in. They do not do anything to sell these goods, and until a demand is created by the producing manufacturer, they will move slowly.

Finances of Farmers

Finally, there has been a certain lack of credit among farm people just as among city people. Forty billion dollars are invested in the unmovable side of agriculture—that is, in lands, buildings, fences, etc., and only six billion dollars are available in tools and live stock. There is, therefore, not enough working capital in proportion to the investment. If farmers had available at a low rate of interest an increased amount of liquid capital so as to build up their producing plants with more and better tools and implements, they would not only be able to pay the interest and a part of the principal each year, but be able to make a bigger profit besides. Our methods of financing the country have been in the interest of urban establishments and not in the interest of rural establishments. A city water plant could sell bonds for extensions and other improvements of service and could get the money at a low rate of interest. The farmer was not able to do this, and if he did get a loan, he had to pay a high rate of interest. If the farmer is better financed, there will be greater activity in agricultural circles.

If there is any depression, therefore, in agricultural matters, it is due not to any one thing, but to several things. Part of these are real; part simply a state of mind. Nevertheless, farming is on a better basis today than ever before. Farmers are making more money than ever before. They are improving their plants better than ever before. They are in a better financial condition than ever before, and they are better prepared to secure what they need than ever before. If dullness is to continue in manufacturing circles, it will not be because farmers are not in a receptive mind to purchase supplies, but rather because manufacturers have failed to properly acquaint farmers with what they have to offer and supply.

Taking Better Care of Machinery

By J D Kingsbury[1]

In our opinion, the comparatively light demand for farm implements on the part of farmers is largely due to the fact that of late years farmers are taking better care of their machinery than was the custom some years ago, and therefore the farm machinery that would have rusted out and fallen to pieces under conditions of neglect is now preserved in good condition until it wears out by actual use—and a well made implement will, with proper care, last years longer than the same implement when not properly cared for. No one can travel through the rural districts of the central west and fail to be impressed by the large number of new buildings, such as implement sheds and garages, that have been constructed by our farmers in recent years. This is one reason, and possibly a sufficient explanation, of the lessening of demand for implements in comparison with the demands of former years.

We have carefully considered your suggestions as to possible explanations, and we are confident that none of them has any considerable weight as a factor in this direction.

Causes of Light Buying

Certainly it is not crop failures; our farmers have had good crops for a series of years and probably made more actual money on the crops of 1913 than on those of any preceding year.

The same applies as to prices. Farmers have uniformly received good prices for practically everything they produced for a long time, and we see no reason why they should feel any uncertainty as to the immediate future. Imports under the new tariff have not as yet made any disturbance of note. The daily papers occasionally print wild-eyed accounts of the receipt of a million bushels of corn from the Argentine Republic and prophesy all sorts of calamity to our farmers who must compete with this million bushels; and yet, a state like Indiana can and does vary in its corn crop as much as 10 to 20 million bushels in a season's production without causing a ripple of comment.

It is the rule that the farmer who buys an automobile not only is in position to do so without a sacrifice, but

[1]Manager, Indiana Farmer Co., Indianapolis, April 4.

also can and does use the car in a legitimate business way, making it a self-supporting convenience, not an expensive luxury. There is no question of the farmer's ability to buy implements or other metal products. We have no way of forecasting the future, but will risk the opinion that after a slack season, such as the present seems to be, the trade will pick up and assume normal proportions in the very near future.

No Serious Economic Cause

By T R Waterbury[1]

Replying to your inquiry as to why farmers are not buying farm implements and other steel products, will say that we have no information to the effect that they are not buying these products in normal quantity in Michigan.

Of course, the season is somewhat backward; we had unusually steady winter weather during March, and today we are having snow flurries instead of April showers. With the frost just going out of the ground, the roads are in poor condition, and the farming campaign has not opened up as early as it ordinarily does in this state.

We have, however, heard no complaint from manufacturers of farm implements with regard to the season's prospects. There has been no general crop failure in Michigan, and prices for agricultural products are generally good. There has been, of course, some speculation in the minds of farmers as well as manufacturers regarding the probable effect of the new tariff, but this has not in our opinion, affected to any degree the purchase of farm equipment, which is considered an economic necessity rather than a luxury by every up-to-date farmer.

Buying Automobiles

Also our advertising patronage from manufacturers of such goods has been well up with former years, which we do not believe would be the case if farmers were not buying their products with the usual freedom. With regard to automobiles, concerning which you ask, we would say that the farmers are purchasing a good many automobiles, but they are paying cash for them, and such purchases do not interfere with the purchase of needed farm equipment.

It is unquestionably a fact that farmers more than any other class of people, refrain from buying luxuries until they are well able to pay for them, and that they are not purchased at the sacrifice of equipment which is required for the economic conduct of the farm.

We are thus of the opinion that any present dullness in the trade concerning which you have asked our advice is due to seasonal variation rather than to any serious economic cause.

[1]Editor, The Michigan Farmer, Detroit, April 4.

Farmers Are More Businesslike

By John F Cunningham[1]

I am inclined to believe that the present situation is due to a combination of circumstances rather than to any one cause. For instance, during the past few years, farmers have been able to get pretty well stocked up with machinery and at the same time, they have been able to erect suitable buildings for the protection of their implements and machines, and therefore, these articles are lasting longer than they formerly did. It is also well to remember that the machines that are being built today are stronger and better in many ways than when they were in more or less of an experimental stage, a few years ago. There is also a factor which is in line with present day economy and general efficiency; this is the fact that, whereas there was formerly a tendency for farmers to overstock on machinery, there is a more business-like attitude taken today, and men are far less likely to buy implements for which they have no urgent need. Added to these conditions is the one which has already been suggested, to the effect that the extensive purchase of automobiles must be taken as a factor in the situation, and we must also remember that farmers, as a class, are thrifty, and that the automobile will not be purchased when farm machinery and implements are actually needed. Therefore, we might suggest that the large sales of automobiles to farmers would indicate that they are pretty well supplied with other necessary farm implements, or they would not be buying automobiles.

Just what influence the tariff and other conditions have had on the situation, is problematical, although it must be considered a factor, in some sections at least. Still the question in the minds of many farmers is whether or not the free admission of the products of other countries will seriously affect their interests, and as long as uncertainty exists, people are bound to be conservative in their investments. General business, you note, has been suffering considerable of a slump for the past few months, and this is undoubtedly reflected in some of the buying operations of farmers. As a class, however, the farmer is in pretty good shape and we are looking for sales of machinery and implements to become much more active when the spring season is a little further advanced.

[1]Managing Editor, Ohio Farmer, Cleveland, April 4.

Will Make Foundry Rigs

Everett D. Betts and John A. Elliott, foundry specialists, have formed the firm of Betts & Elliott and established a shop at 654 Franklin street, Detroit. The new partnership will devote its attention to the design and construction of rigs for handling difficult molding propositions in malleable, gray iron and steel foundries. The shop is also equipped to make dies for straightening malleable castings. The firm does not intend to manufacture molding machines, but to build rigging for turning out castings that cannot be profitably made with ordinary standard equipment. Both partners have been engaged in the foundry business for over 20 years and have recently held responsible positions with the Michigan Malleable Iron Co.

TIPS FOR NEW BUSINESS

Equipment needs of the Iron and Steel works, Machine shops, Foundries and other Metal Working plants

In New York, most machinery dealers report a slight improvement the last week in the amount of business booked. It seems that almost every concern has closed a sale on which it has worked for a long time, or has booked orders somewhat more important than usual, and the result is that a little better feeling prevails. The general character of the business, however, is not such as to indicate that a turn has set in. Only one of these orders came from a railroad; these interests continue to restrict purchases as much as possible. The General Electric Co. and the Morrow Mfg. Co., Elmira, N. Y., were included among the purchasers. The latter concern in March placed one of the largest orders for screw machines booked in this territory for a long time. It bought between 50 and 60 screw machines from one concern. The Taylor-Wharton Iron & Steel Co., High Bridge, N. J., is expected to be in the market during the next few months for a large quantity of machinery for its proposed new plant at Easton, Pa.

In Pittsburgh, the market for machine tools and heavy rolling mill equipment remains decidedly dull, and plant operations have been further decreased in a number of instances. Despite the fact that iron and steel mills are operating on reduced schedules, owners do not appear willing to make improvements or replacements at this time, old equipment being repaired whenever possible. Dealers say inquiry is fairly good, but new buying is light.

In Cincinnati, machine tool business done during March shows a slight increase over that of January or February, due to the fact that three or four makers secured several good contracts. General conditions remain about the same. The majority of machinery manufacturers, especially those of machine tools, report that they are barely operating, and foundries are running less than half time. Second-hand machinery is slow and small electrical equipment is fair. Special machinery is dull at the present time, but makers are busy on old orders. The best sellers in the machine tool line during March were milling machines, lathes and metal bending and woodworking machinery.

EASTERN STATES

LEOMINSTER, MASS.—The manufacture of piano cases has been and is one of the important industries of this town. Now making pianos will be added, F. G. Smith & Co., Brooklyn, N. Y., makers of the Bradbury piano, have had their cases made here, but have disposed of their Brooklyn property and in future the Bradbury piano will be made here complete, in the same shop with the cases. This will require 50 more employes, the most of them coming probably from Brooklyn.

TURNER'S FALLS, MASS.—Ground has been broken for the factory of the McLane Silk Co., recently formed. Mr. McLane, the head of the corporation, was superintendent for a number of years, of the big Skinner Mills at Holyoke. The weekly payroll of the new concern will be about $1,000.

WEBSTER, MASS. — The Webster & Southbridge Gas & Electric Co., operating in towns of Webster, Southbridge, Sturbridge, Oxford, Brimfield, Charlton, Dudley and Wales, has contracted to install new machinery intended to develop 2,000 horsepower. This doubles its capacity.

WORCESTER, MASS. — The Wyman & Gordon Co. has added one more land purchase to the several made in recent years. The present tract is on a street corner adjoining present plant and is 115 x 43 feet. This extra realty provides for future development.

WORCESTER, MASS.—Daniel E. Twaits, coming from Chicago, has invented a new line of automobile grease cups. The Worcester Pressed Steel Co. has decided to manufacture these specialties and the Twaits Mfg. Co. has been incorporated to do the selling. Capital $10,000. President and treasurer, John W. Higgins; clerk, Arthur P. Higgins. These and Mr. Twaits are the directors.

WORCESTER, MASS. — The Worcester Autogenous Welding & Construction Co., formerly conducted by F. D. Campbell, has been incorporated for $25,000. President L. A. Morrill; secretary and treasurer, M. E. Donohue. The new company is arranging to double its plant and has retained Herbert L. MacKinnon as superintendent because of his large experience in the welding business.

MERIDEN, CONN. — The Handle Co., which manufactures lamps and fixtures, has let contract for construction of a new four-story factory building, 40 x 88 feet.

NEW BRITAIN, CONN.—The Beaton & Caldwell Co., manufacturer of valves, recently purchased the plant of the McGee Supply Co., Carlstadt, N. J., and is moving the equipment thus acquired to New Britain, where it is to be stored for the present. Plans are under way for the erection of a four-story plant in the rear of the present Beaton & Caldwell plant and when this is ready the company's capacity practically will be doubled. In the meantime the capitalization will be increased from $50,000 to $100,000. The store of the McGee company in New York also has been taken over by the New Britain concern.

NEW HAVEN, CONN. — The Neptune Hardware Co. will build a one and two-story addition to its plant, 60 x 200 feet, of brick and steel.

BINGHAMTON, N. Y. — Binghamton Bridge Co. will be incorporated with $100,000 capital and will erect two buildings soon; Judge Harold L. Hart, attorney.

BUFFALO.—George F. Grivel & Co. has been incorporated; foundry supplies; $10,000; by George F. Grivel, William Dodge and L. M. Dentinger.

KINGSTON, N. Y.—Bids will be taken April 22 for a viaduct over the Rondout creek to cost $200,000. Steel and reinforced concrete, 1,200 feet long, 54 feet wide. John L. Carlisle, 55 Lancaster street, Albany, is commissioner.

MOUNT VERNON, N. Y.—Volute Spring Shock Absorber Co. has been incorporated; $100,000; by John G. Rock, Mark D. Stiles, Edward M. Benford.

NEW YORK (BRONX).—East Side Iron Works has been incorporated; $5,000; by Samuel Rubin, 1000 Findlay avenue, New York; Morris Berkowitz, Ida Sussman, New York.

NEW YORK CITY.—Richardson Mfg. & Distributing Co. has been incorporated; metal goods; by F. K. M. Delavan, Nicholas Orlando, G. D. Richardson, 367 Fulton street, Brooklyn, N. Y.

NEW YORK CITY.—Standard Tractor Co. has been incorporated; motors, engines, tractors, machinery; $50,000; by J. W. Blaisdell, Brooklyn; G. T. Whyte, Jersey City; D. H. Hamje, N. J.

SCHENECTADY.—The Mica Insulator Co. plans to erect a $72,000 factory building on Villa road; present address, 293 Dock street.

SIDNEY, N. Y.—Bids will be received some time in May for a $125,000 water system; Henry W. Taylor, 10 State street, Albany, N. Y., is engineer; William Thorp, city clerk.

UTICA, N. Y. — Western Engineering & Mfg. Co. has been incorporated; $55,000; is building a 50 x 130-foot fireproof factory building.

WALDEN, N. Y.—L. & T. Mfg. Co. has been incorporated; machinery; $10,000; by Samuel Andrews, Cyrus D. Fowler, Emory C. Evans, Walden.

BUTLER, PA. — Wishbone Auto Steel Wheel Co. has been incorporated; $100,000; by H. W. F. Graham, J. F. Andrews, J. E. Forsythe, W. S. Watson, A. P. Starr, G. G. Stuart, Frank Badger, J. M. Gastman et al.

CHESTER, PA.—Houston Mfg. Co. has secured a building permit to erect a 1-story corrugated iron building.

CHESTER, PA.—Aberfoyle Mfg. Co. asks to be allowed to erect a corrugated iron

structure on its property at Fourth street and Morton avenue.

CONSHOHOCKEN, PA. — Plans have been completed for a bridge over the Schuylkill river, concrete and steel, to cost $250,000. James Cresson, Norristown, Pa., is engineer.

ELLWOOD CITY, PA. — The Standard Engineering Co. announces the addition of a cast iron roll department for the manufacture of sand and chilled rolls for all purposes.

HAZELTON, PA.—Gross Mfg. Co. will rebuild its brass foundry damaged by fire March 27. Work to start at once.

PHILADELPHIA.—Aldrich Pump Co. has been incorporated; $5,000; by Herbert M. Howe, F. P. Howe, Philadelphia; Roscoe H. Aldrich, Allentown.

PITTSBURGH.—Highland Ornamental Iron Co. has been incorporated; $5,000; by G. O. Rogers, Fred T. Johnson, N. V. Johnson.

YORK, PA.—Valuable patterns and core boxes were destroyed in a fire which broke out in the foundry of the Morgan Smith plant March 29. Loss about $800.

YORK, PA.—The Diamond Chain Co. has been granted a charter; capital is $12,000, and officers are as follows: Samuel M. Horn, treasurer; Prudence E. Morningstar, Samuel M. Horn, North York; James C. Smith, Lucy M. Smith and Harry A. Morningstar, York, are directors.

HARRISON, N. J. — The Hyatt Roller Bearing Co. let the contract for erecting a 4-story, 80 x 200-foot reinforced factory building at Harrison to the American Concrete Steel Co.

JERSEY CITY, N. J.—A bridge is being planned from Elizabethport to Bayonne, to cost about $1,250,000, steel and concrete, 8,000 feet long with two lift spans. Beller, Hodge & Baird, 149 Broadway, New York City, consulting engineer.

NEWARK, N. J.—American Metal Moulding Co. has been incorporated; metal conduits for electric wires; $50,000; by Chas. A. Reibovitz, Clarence Hanson, Gustav A. Johnson.

TRENTON, N. J.—Eno Oxy & Appliance Co. has been incorporated; oxygen decarbonizers, welding and cutting torches and appliances; $50,000; by C. H. Endebrook, F. H. Endebrook Jr., N. J.; R. I. Erlichman, Philadelphia.

WILMINGTON, DEL. — W. L. Osborne Valve Co.; machinery; $150,000; by H. E. Latter, W. J. Maloney, O. J. Reichard, Wilmington.

WASHINGTON.—Bids will be received at the supervising architect's office until 3 p. m., April 15, for construction complete (including mechanical equipment, interior lighting fixtures and approaches) of the United States post office at Tarboro, N. C.

CENTRAL STATES

BELLEFONTAINE, O.—The bridge to be erected over the Big Four tracks will be 65 feet long with 18-foot roadway and 4-foot sidewalk; about 45,000 pounds of steel will be used. Estimated cost is $2,600.

CANAL DOVER, O.—Braun-Hoff Electric Co. has raised $18,000 in subscriptions which enables the company to make arrangements for manufacturing motors here.

CANTON, O.—The project of having a municipal electric light plant is being much agitated here.

CINCINNATI.—Plans are being prepared by S. S. & G. H. Godley, architects, Cincinnati, for an eight story, fireproof building to be erected at the southwest corner of Sixth and Sycamore streets. The new structure will be used as a power building, and each floor will contain 11,000 square feet of floor space. The lot is 90 x 140 feet. Building operations will be begun some time next fall.

COLUMBUS, O.—Van Duzen Roys Co. has been incorporated; gasoline engines, concrete mixers and machinery; $50,000; by David Greene, Frank Van Duzen, John H. Roys, John H. Verce, Perin B. Monypeny.

IRONTON, O.—The Otto Valve Co. has been incorporated with a capital stock of $10,000 to manufacture tire valves. Among the incorporators are Otto Ebert, A. M. Johnson, Dan C. Jones and E. B. Newman.

LANCASTER, O. — John D. Miller, Charleston, W. Va., a stockholder in the Charleston foundry, is considering starting a similar foundry here for making car wheels and railroad equipment.

LONDON, O.—The Thiele & Baker Mfg. Co., London, O., has been incorporated with a capital stock of $25,000, to manufacture metal fence. Among the incorporators are S. S. Baker, E. A. Thiele, C. L. Thomas, B. B. Thompson and H. C. Hasues

MARIETTA, O.—The Marietta Shale Brick Co. has been incorporated to manufacture and deal in brick; capital, $15,000; incorporators, A. E. Flanders, Emily Flanders, E. H. Flanders, Lucille Flanders and Nellie Sale.

MASSILLON, O.—Bids will be taken until April 10 for a viaduct over railroad tracks, canal and river, 1,000 feet long, steel and reinforced concrete, to cost about $38,000. W. L. Bender, Canton, O., is engineer.

MT. VERNON, O.—Hope Forge & Machine Co. has been incorporated; $200,000; by D. B. Grubb, A. R. Sipe, C. N. Lorey, C. K. Conrad, Howard Spitzer.

PIQUA, O.—The Piqua Spring Doubletree Co. has been incorporated to manufacture and deal in machinery; capital, $16,000; incorporators, T. C. Jones, D. E. Werner, Albert Werner, Robert Werner and J. N. Hauver.

SPRINGFIELD, O.—A new boiler room and an addition to the repair shops are being considered by the Springfield Railway Co. The company will also erect new car barns.

TOLEDO, O. — The New York Central railroad plans improvements here to cost about $3,000,000; air line junction yards and repair shop, new union passenger station, additional tracks across the Maumee, enlargement of East Toledo yards, separation of all crossings and improvements on the Detroit division. It is hoped to complete the work by 1915.

XENIA, O.—Stewart Shocker Co. has been incorporated; grain machinery; $60,000; by Arthur Gesler, H. S. Bailey, W. D. Wright, John Donaldson, F. D. Torrence.

ZANESVILLE, O. — Commissioners have authorized a $35,000 bond issue for replacing bridges washed away in Noble county.

WHEELING, W. VA.—Bids will be received until April 20 for a fireproof power house and boiler chimney, furnishing and installing one 115-horsepower boiler, one steam-driven water pump, one service pump, etc., at Dam No. 12, Ohio river near here. Address Major J. P. Jervey.

CRAWFORDSVILLE, IND. — The city council is considering the matter of ordering additional equipment for the lighting plant.

FORT WAYNE, IND.—Plans for the Fort Wayne Electric Works are nearly complete and bids will be taken at once; estimated cost, $400,000.

INDIANAPOLIS.—The Standard Concrete Machine Co. has been incorporated to manufacture concrete machinery and appliances; $25,000; by H. F. Schone, C. B. Henkel and C. A. Halt.

CHICAGO. — The Atkins Carburetor Co. has increased its capital from $2,500 to $32,500.

CHICAGO. — Union Foundry Works, 38 South Dearborn street, has been awarded the structural steel for an apartment building for M. M. Beaupre.

CHICAGO.—Collins & Norris have taken the general contract for an apartment building for L. A. Collins, 133 West Washington street, to cost $140,000, of brick, steel and tile, three stories, 100 x 200 feet.

CHICAGO. — Jackson Boulevard bascule bridge has been awarded to the Strobel Steel Construction Co., 53 Jackson Boulevard, at $231,450.

CHICAGO.—Paul Gehrhardt, 64 West Randolph street, is preparing plans for a family hotel near Lincoln Park, 10 stories, 200 x 280 feet, of steel, reinforced concrete and tile, to cost about $1,500,000.

EAST PEORIA, ILL.—The city will vote April 21 on a $15,000 bond issue for a water works plant. A free site has been obtained and additional funds will probably be raised for water mains; A. M. Morgan, engineer, has plans ready.

GALESBURG, ILL. — Willis Mfg. Co. starts work at once on a $22,000 addition to its factory. It will be two stories, 50 x 200 feet, fireproof construction. About $3,000 will be spent on additional machinery.

DETROIT.—The Murphy Power Co. plans a large power plant to replace the one in the present Murphy building.

DETROIT.—The appropriation of $125,000 for the proposed Belle Isle bridge has been made; construction will start at an early date.

GRAND RAPIDS, MICH. — Rempis & Gallmeyer have purchased a site adjoining their present foundry for a brass foundry to be erected soon.

APPLETON, WIS.—The general contract for the erection of the new Y. M. C. A. building here was awarded to Fraser & Greinke, Appleton, at $59,769. The contract for electrical work, heating, etc., was awarded to the Langstadt-Meyer Co., Appleton.

APPLETON, WIS.—The Wisconsin Public Service Co., operating light, traction and power lines throughout the Fox River Valley, is planning to build a terminal building or public service headquarters in Appleton this year. The site has been purchased.

ELKHORN, WIS.—F. H. Eames, John J. Haugen and L. M. Swan have organized the Olsen Concrete Mixer Co., capital stock $20,000, to engage in the manufacture of power mixing machinery.

FOND DU LAC, WIS.—Articles of incorporation have been filed by the Price Mfg. Co., of Fond du Lac. The capital stock is $100,000 and John R. Price, W. F. George and William Kallberg are the corporators.

GRAND RAPIDS, WIS.—Edw. Kampe has purchased the McCarthy blacksmith and machine shop building and will re-equip for automobile and gas engine repairs and construction.

KEWAUNEE, WIS.—The Aluminum Sign Co. is planning a large addition and the purchase of new punching and stamping machinery.

MADISON, WIS. — The Wisconsin Construction Co., Chippewa Falls, Wis., was the lowest bidder on the general construction of the new Liberal Arts building of the University of Wisconsin at $150,000. The lowest bidder on the Agricultural Soils building was N. Quinn, Madison, at $58,000.

MARINETTE, WIS.—The board of education has engaged John D. Chubb, architect, 32 North Clark street, Chicago, to make plans for the new Marinette Central high school building, to cost $125,000. Geo. H. Landgraf, city supt.

MARSHFIELD, WIS. — William Koehler, of Athens, Wis., has purchased the Henderson property at Marshfield and will build a garage and machine shop, 40 x 100 feet.

MARSHFIELD, WIS.—The Augustine Rotary Valve Engine Co. is completing its experimental work and preparing to engage in the extensive production of its new type of internal combustion engine. A small list of equipment will be required.

MILWAUKEE, WIS. — The war depart-

ment has given final approval to plans for a new railroad bridge for the Chicago & Northwestern R. R. Co. at Jefferson street, Milwaukee, and construction will be undertaken at once. W. H. Finley is chief engineer.

PLYMOUTH, WIS.—The Plymouth Foundry & Machine Co., which recently increased its capital, has awarded contracts for the erection of a 2-story brick addition, 60 x 136 feet, to be ready July 1. The concern produces ensilage cutters and other power farm machinery.

SHEBOYGAN, WIS.—The Reiss interests, which recently took over the Sheboygan Railway & Electric Co., have set aside $25,000 for extensions and replacements. Jerry Donohue is chief engineer.

SUPERIOR, WIS. — The Superior state normal school building was destroyed by fire with a loss of $300,000. It will be rebuilt at once. William Kittle, Madison, Wis., is secretary of the board of normal school regents.

WEST BEND, WIS.—The Wisconsin Dental Burr Co. has increased its capital stock from $30,000 to $50,000 to provide for extensions and additional equipment.

DAVIS, MO.—Hadley Mfg. Co., Indianapolis, has bought a 700-acre tract at the east end of Davis Ferry and it is reported that the firm intends to erect a large plant for manufacturing agricultural implements. Armetus N. Hadley is president.

GALT, MO.—Galt Light & Power Co. has been incorporated; $10,000; by A. D. Miller, D. H. Clark, N. D. Jordan.

KANSAS CITY, MO.—Metal Specialty Co. has been incorporated; $30,000; by A. H. McKinley, A. J. Davies, John F. Kendig.

ST. JOSEPH, MO.—Thomas W. Dodd is at the head of a company formed to erect a structural steel and iron fabricated works.

ST. LOUIS.—B. L. Fry Mfg. Co. has been incorporated; $10,000; by Benjamin L. Fry, John L. Fry, and R. M. Homer.

ST. LOUIS.—Work has begun on the 2-story, 106 x 280-foot addition to the plant of the Schurk Iron Works. The plant will be finished about July 4.

SOUTHERN STATES

ANDREWS, N. C.—The Hiawassee railroad has been incorporated to build a 35-mile electric railroad from Andrews to Haynesville and Hiawassee, Ga.; incorporators, J. W. Walker, of Andrews and G. H. Haigler, Haynesville.

WILMINGTON, N. C.—Fire, March 29, badly damaged the machine shops and planing mill of the Atlantic Coast Line railroad. The loss is in the neighborhood of $10,000.

CHARLESTON, S. C. — The Valk & Murdoch Works, according to plans outlined some time ago in THE IRON TRADE REVIEW, has been incorporated with capital stock of $150,000 and bonds of $150,000. It will begin work immediately on the construction of a marine railway, boiler works and machine shops. It will be the only ship building and repair plant between Norfolk and Jacksonville.

CORDOVA, ALA.—Contracts will be let in 90 days for a bridge over the Warrior river, 1,000 feet long, to cost about $30,000. Chas. M. Sartain, probate judge, is in charge.

EUNICE, LA.—Bids will be received until 2:30 p. m., April 16, for a building, foundations, machinery and pole lines for a municipal electric light plant. Stanislaus Wyble, mayor.

SHREVEPORT, LA.—City votes April 15 on $1,000,000 bond issue for installing water works.

CHATTANOOGA, TENN. — Chattanooga Iron Works has been incorporated; $15,000; by O. B. Stauffer, John Bauer, J. F. Finlay, C. S. Coffey, Edward Finlay.

WESTERN STATES

WAHPETON, N. D.—George Manowskes will establish a factory for windmills and farm machinery.

VALLEY, NEB. — Bids will be received until April 14 at the county clerk's office, Omaha, for a bridge across Elkhorn river, four miles northwest of here. The bridge will be of steel, high truss, 240-foot, 12-panel pin connected span with 16-foot roadway.

PLENTYWOOD, MONT. — Bids will be received by Ben H. Johnson, county clerk until April 13 for furnishing Sheridan county with three cars, minimum weight corrugated galvanized metal culverts; one car f. o. b. Bainville, Mont., one car f. o. b. here and one car f. o. b. at Outlook.

RED LODGE, MONT.—The Carbon Stillwater Electric Railway Co. has been incorporated to build a 40-mile interurban railroad line from here to Columbus; capital, $750,000.

SCOBEY, MONT.—D. Bennett and others will install an electric light plant here.

CANON CITY, COLO.—A steel viaduct 660 feet long is to be erected over the Arkansas river and Santa Fe and Denver & Rio Grande tracks, to cost $20,000.

TWIN FALLS.—Henry Schildhauer of the Idaho Pacific Railway has filed articles of incorporation for 100 miles of interurban road to connect Twin Falls county with Hagerman valley; capital stock, $250,000.

BLAINE, WASH.—Blaine Electric Co. has been incorporated to build a line between here and Lynden; capital stock, $250,000.

SEATTLE, WASH.—It is reported that E. W. Houghton, architect, Downs building, is drawing plans for a 22-story office building to be erected here; estimated cost, $750,000. Chicago capitalists are financing the deal; local representative, Clarence Howard Jones.

TACOMA, WASH.—Contract for the O. W. & R. bridge over Fifteenth street water way has been given to the Missouri Valley Bridge Co., Leavenworth, Kas.; cost of bridge material, $240,000; erection, $80,000.

BAKER, ORE. — Improvements to cost $100,000 will be started soon by Sumter Valley railroad; Guy L. Anderson, general manager.

OREGON CITY.—The county court has ordered plans for a 225-foot steel bridge over Clackmas river at Barton.

EUGENE, ORE. — The Eugene Electric Cone Mfg. Co. has been incorporated; $20,000; by Frederick H. Miller, Ernest House, et al.

LOS ANGELES, CAL.—Commercial Foundry Co. has been incorporated; $15,000; by William Sharpe, S. G. Lowe, Guy Downing, Albert Jones.

YUBA CITY, CAL.—Bids will be asked about May 1 for a reinforced concrete bridge at Butte Slough, 1920 feet long. Erie L. Cope, 68 Post street, San Francisco, is consulting engineer.

TRADE NOTES

BIDDEFORD, ME.—The Saco-Lowell Machine Co. giving poor business conditions as the cause, has reduced its working force 25 per cent. About 200 men are thus out of employment. The company, which operates large shops in Biddeford and Newton Upper Falls, Mass., manufactures mill machinery.

BRISTOL, CONN.—The general offices of the New Departure Mfg. Co. are now located at Bristol.

CHICAGO.—The Acorn Brass Mfg. Co. has been dissolved and a new concern incorporated with the same name, to take over the plant and equipment of the old. The new L. Kohlhase, Henry Bandlow and Charles H. Soskle. Organization has not been completed but the plant at 426 South Clinton street, Chicago, is in operation. The output of the company will be gasoline and electric lighting apparatus and other brass devices.

CINCINNATI.—The Joseph B. Fey Co. has leased manufacturing space at 327-329 West Fourth street, and will engage in the making of an electric vibratory apparatus which is the invention of Joseph B. Fey. Among those interested in the proposition are J. B. Fey, John E. Sullivan, Frank H. Kunkel, and H. J. and H. L. Robben.

CINCINNATI.—The Israel Bros. Iron & Metal Co., Dayton, O., advises that it has purchased a four acre tract of ground including a two-story brick building 60 x 140 feet, equipped with line shaft, motors, elevators, etc. Two new shears and one 150 pound railroad scale will be installed in addition to other machinery with the view of operating economically. Switches will be laid to both the Big Four and Erie railroads. The company will handle scrap iron, rubber, metals, second hand machinery and pipe of all description.

CLEVELAND.—The Cuyahoga Spring Co. has increased its capital stock from $20,000 to $30,000. It manufactures wire springs and forms.

CLEVELAND.—Ohio Smelting & Refining Co. has been incorporated to engage in general smelter business; capital, $10,000; incorporators, I. M. Garfinkel, Sallie Garfinkel, Isaac Miller, H. R. McCoy, Samuel Muchnick.

CLEVELAND. — The Gould Storage Battery Co., of New York, is trying to rent the new building at 1761 to 1765 East Eighteenth north of Euclid avenue, Cleveland. The building has 12,000 square feet of floor space and is owned by George A. and Edward W. Paul.

CUYAHOGA FALLS, O.—Stockholders of the Falls Tire & Rubber Co. have voted to increase the capital stock from $200,000 to $300,000. The company will also maintain a factory branch succeeding the J. F. Allen Co., 2001 Euclid avenue, Cleveland, which has represented the Falls Tire Co. in Cleveland for the past year. John Welton Jr., of Akron, will have charge of the new branch.

FORT WAYNE, IND.—The Wayne Machinery Co., recently incorporated at $25,000, was formed by creditors of the Hanna-Brackenridge Co. in an effort to redeem some of the money lost when that firm failed. The incorporators are H. Van Arnam, N. Rothchild, W. E. Freidell and Charles Spanley, receiver for the bankrupt firm.

INDIANAPOLIS.—The plant of the American Motors Co., manufacturers of the American underslung automobile, was sold on March 30 at receiver's sale to Samuel L. Winternitz & Co., Chicago, for $110,000. The purchasers will sell the plant piece by piece at public sale.

KANSAS CITY, MO.—The branch house of the Chandler Pump Co. at Kansas City, Mo., has been taken over by a separate organization which has incorporated under the laws of Missouri as the Chandler Pump & Supply Co. with a capital stock of $50,000 fully paid. The officers are William H. Dunshee, president; F. M. Hale, vice president and W. D. Dunshee, secretary and treasurer.

LONDON, O.—The Thiele & Baker Mfg. Co. has been incorporated to make metal fence; capital, $25,000; incorporators, S. S. Baker, E. A. Thiele, C. L. Thomas, R. B. Thompson, H. C. Hasues.

MILWAUKEE. — The B. Hoffmann Mfg. Co., Milwaukee, has been awarded the contract to furnish 210 standard and special gate valves from 2 to 8 inches of its own make for the Milwaukee water department, amounting to about $3,500.

MILWAUKEE, WIS. — The American Foundry & Furnace Co.'s Milwaukee office has booked two large school heating con-

tracts, one being for the new Saxon (Wis.) high school, to cost $30,000, and the other in the high school at Kingston, Wis., to cost $25,000.

NEW BRITAIN, CONN.—The Corbin Cabinet Lock Co., a branch of the American Hardware Corporation, has changed its schedule from 45 hours to 55 hours a week, because of increased business.

NEW YORK CITY.—Asbestos Protected Metal Co., Beaver Falls, Pa., announces the removal of its New York office to more commodious quarters at 52 Broadway; with P. M. Stewart, district manager, in charge.

NEW YORK.—The New York office of the Mumford Molding Machine Co. was closed April 1, and E. H. Mumford, vice president and general manager moves his office to the factory, 2059 Elston avenue, Chicago, in order that he may be in close touch with the business. All mail should be sent to Chicago. Mr. Mumford personally may be addressed care of Machinery Club, while in New York.

NILES, O.—The sales office of the Niles Car Mfg. Co. on May 1 will be removed from Cleveland to Niles and J. A. Hanna, traveling salesman for the company will locate there. Aside from his duties in the sales department, he will take up those of Vice president T. E. Thomas, who is resigning.

NORWICH, CONN.—The plant formerly occupied by the Tobin Arms Co., at Norwich, has been purchased by the Warner Arms Corporation, Brooklyn, N. Y. The Warner company proposes to move its business to Norwich immediately.

OCONTO, WIS.—The Jennings Dredge & Pump Co., Chicago, has awarded a contract to Georne Ansorge of Oconto, Wis., for the construction of a 100-foot barge of 40-foot beam and 8-foot depth. The owner will install machinery and equipment upon completion of the hull.

PITTSBURGH, PA. — The Phoenix Iron Works Co., Meadville, Pa., manufacturer of engines and boilers, has moved its Pittsburgh office to the Empire building.

QUINCY, ILL.—The Grimm Boiler Co. has been reorganized and capitalized at $25,000. It has also changed its name to the Illinois Mfg. & Supply Co. Oscar E. Grimm is president and superintendent and C. N. Terwische is secretary and treasurer.

RACINE, WIS.—The Geo. W. Jagers Mfg. Co., organized recently by George W. Jagers, formerly president of the Racine Mfg. Co., and which has since taken over the Graham Mfg. Co. and the Wadewitz Machine Co., of Racine, has closed a contract with the Argo Motor Co., of New York, for 10,000 light car motors for delivery up to July 31, 1915. The contract also has a clause calling for 20,000 motors during the period from Aug. 1, 1915, to July 31, 1916. Mr. Jagers has leased the former plant of the Racine Hosiery Co. at Fifteenth and Clark streets, Racine and is equipping for the production of small internal combustion engines.

SHEBOYGAN, WIS.—The principal interest in the Electric Fire Alarm Co., of Manitowoc, Wis., has been purchased by the Honold brothers, of Sheboygan, who intend to move the equipment to Sheboygan and establish a large plant.

SUPERIOR, WIS. — The Pittsburgh Coal Co. was awarded the general contract for lengthening its No. 5 dock at Superior and other improvements to the Sims-Carey Co., St. Paul, Minn. Estimated cost, $100,000.

SUPERIOR, WIS.—The contract for the erection of the steel superstructure of the addition and extension to the Belknap street viaduct has been awarded to Frankman Bros. & Morris, Minneapolis. The structural material has already been purchased.

TACOMA, WASH.—The Caldwell Machinery Co. which went into the hands of the receiver in December, has been taken over by B. R. Lewis and L. L. Schauble, who have changed its name to the Sterling Machinery Co. A little additional equipment may be added, but no other changes will be made.

THIENSVILLE, WIS.—J. F. Wiemann, proprietor of the Milwaukee River Canning Co., will erect a brick and mill construction warehouse, 115 x 155 feet, with steam heating system and power plant. The plans are by W. F. Hilgen, architect, Cedarburg, Wis., who will take bids at once.

TWO RIVERS, WIS.—Plans for the new woodworking shop for the Hamilton Mfg. Co. are being prepared by Lockwood & Greene, consulting engineers, 38 South Dearborn street, Chicago. The structure will cost $100,000 and bids will be taken after March 18. Previously noted.

TWO RIVERS, WIS. — The Alfred C. Goethel Co., 301-303 Fourth street, Milwaukee, has the contract for installing a Cyclone blower and exhaust fan system in the new shop buildings of the Aluminum Goods Co. here. Bids are being taken for the installation of a complete sprinkler system of fire protection. C. H. Tegan, Manitowoc, is the architect.

WARE, MASS.—The Grip Coupling Co. has been sold at auction to E. A. Milner, Boston, for $8,500. It has been in business in Ware seven years but has been in receiver's hands several months.

WEST BEND, WIS. — The West Bend Light & Heating Co. is taking bids for remodeling the former Kuehlthaw flour mill into a hydro-electric plant. G. W. Kuehlthaw is president.

WHITINSVILLE, MASS.—The foundry of the Whitin Machine Works has been running five days per week for over a year, but now starts on full time schedule. The Whitin Machine Works employs 3,000 hands when going full blast but the number now at work is about 2,000. The spinning department is working nights.

WORCESTER, MASS. — The Young Machine & Tool Co. has been petitioned into insolvency because of alleged preference given while the company was said to have been insolvent. The three petitioning creditors' claims aggregate $540. The Young Machine & Tool Co., formerly W. C. Young, has manufactured small lathes for about 25 years.

New Trade Publications

WELDING AND CUTTING APPARATUS.—A 16-page catalog issued by the Waterhouse Welding Co., Boston, is devoted to its line of equipment for welding castings and for cutting steel. The outfit is of the acetylene type and can be furnished in various sizes to meet different requirements.

PUNCHES.—A 32-page catalog issued by the I. P. Richards Co., Providence, R. I., is devoted to its extensive line of punches for both iron and steel. The various punches made by this company are illustrated, together with table of sizes and descriptions of the work for which they are best adapted.

ELECTRIC CONTROL SYSTEMS. — The Sprague Electric Works of the General Electric Co., New York City, has issued a 32-page catalog devoted to electric control systems, especially applicable to newspaper and rotary magazine presses. The catalog is well illustrated and shows numerous installations of this control apparatus.

BRASS FOUNDRY EQUIPMENT. — A bulletin recently issued by the J. W. Paxson Co., Philadelphia, is devoted to its extensive line of brass foundry equipment and supplies. Practically every type of furnace is illustrated, as well as crucibles, flasks, slip jackets, steel bands, flask pins and ears, flask boards, clamps, ladles, etc. The supplies that can be furnished include facings, molding and core sands, etc. The bulletin is unusually complete and should prove a valuable addition to every brass foundryman's trade literature.

SAFETY ELEVATOR STOP.—A 32-page catalog issued by A. F. Plock, Pittsburgh, is devoted to the Hinkel safety stop which can be applied to elevators, cages, skip hoists, etc., at blast furnaces, mines and warehouses. Various applications of this safety stop are illustrated, with views of different plants at which this device has been installed.

ELECTRIC DRILLS AND GRINDERS.—Two bulletins issued by the Chicago Pneumatic Tool Co., Chicago, are devoted to this company's line of electrical drills and grinders. An electric sensitive drilling stand also is shown, which is built in five sizes to take the standard Duntley side spindle drills of either the universal or direct current types, ranging in drilling capacity from $\frac{3}{8}$ to $\frac{1}{2}$ inch in metal.

HYDRAULIC PRESSES AND PUMPS.—The Hydraulic Press Mfg. Co., Mount Gilead, O., has issued a new catalog containing 128 pages, which is devoted to this company's line of hydraulic presses and pumps for high pressure purposes. The first 15 pages of the catalog illustrate the home office and factory and describe the branch office facilities. Various designs of hydraulic presses and pumps recently described and illustrated in THE IRON TRADE REVIEW are shown and the work conveys in a comprehensive manner the development and scope of the hydraulic field covered by the equipment built by the Hydraulic Press company.

SILICA BRICK AND SHAPES.—An exceedingly valuable 68-page booklet, devoted to silica brick and shapes, has been issued by the Mount Union Silica Brick Co., Mount Union, Pa. The various standard shapes are shown, together with their dimensions and special shapes also are described. A valuable feature of this work are the halftone cross-section illustrations of various types of furnaces, showing clearly the use of the various brick and shapes required in their construction. These furnaces include Siemen's crucible steel melting, reverberatory for copper smelting, producer gas glass tank, Semet-Solvay coke oven, Kopper coke oven, United Otto coke oven, double puddling furnace, open-hearth, soaking pit, etc. Numerous tables also are included, which will prove of value to all users of silica brick.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(First half delivery.)

Bessemer, valley	$14.00
Bessemer, Pittsburgh	14.90
Basic, Pittsburgh	13.90 to 14.15
Basic, Philadelphia	14.25 to 14.50
Malleable, Pittsburgh	14.15 to 14.40
Malleable, Chicago	14.25
Malleable, Philadelphia	15.50
Malleable Buffalo	14.00 to 14.50
No. 1X Philadelphia	15.25 to 15.50
No. 2 foundry, Pittsburgh	14.15 to 14.40
No. 2 foundry, Cleveland	14.00 to 14.25
No. 2 foundry, Ironton	13.50
No. 2 foundry, Chicago	14.25
No. 2X foundry, Philadelphia	14.90 to 15.25
No. 2X foundry, New York	14.75 to 15.25
No. 2X foundry, Buffalo	14.00 to 14.25
No. 2 plain, Philadelphia	14.50 to 14.75
No. 2 plain, New York	14.50 to 14.75
No. 2 plain, Buffalo	13.75
No. 2 southern, Birmingham	10.75 to 11.00
No. 2 southern, Cincinnati	13.75 to 14.25
No. 2 southern, Chicago	14.85 to 15.85
No. 2 southern, Philadelphia	14.75 to 15.00
No. 2 southern, Cleveland	15.00 to 15.35
No. 2 southern, New York	14.75 to 15.25
No. 2 southern, St. Louis	14.50 to 15.00
Virginia, 2X, Philadelphia	15.30 to 15.55
Virginia, 2X, Jersey City	15.60 to 15.85
Virginia 2X, New Eng., all rail.	16.20 to 16.70
Gray forge (eastern Pa.)	13.90 to 14.25
Gray forge, Pittsburgh	13.65 to 13.90
Gray forge, Birmingham	9.75 to 10.25
Silveries, 5 per cent, Cleveland.	17.30 to 17.55
Silveries, 5 per cent, Birmingham	12.50
Silveries, 5 per cent, Chicago	16.85
Silveries, 8 per cent furnace	15.75 to 16.00
Standard low phos., Phila.	21.00
Lebanon low phos., furnace	17.00 to 17.50
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	15.50 to 16.50
Charcoal, Buffalo	16.00 to 17.00
Charcoal, Birmingham	25.00
Middlesbrough, No. 3, Phila., ex ship	15.00 to 15.25

IRON ORE

(Lower lake ports.)

Old range Bessemer, 55 per cent.	$4.40
Mesabi Bessemer, 51½ per cent.	4.15
Old range, non-Bes., 55 per cent.	3.60
Mesabi, non-Bessemer, 51½ per cent.	3.40

(Per unit Philadelphia.)

Foreign Bess., 50 to 65 per cent.	7 to 8c
Foreign non-Bess., 50 to 65 per cent.	7 to 8c

COKE

(At the ovens.)

Connellsville furnace	$1.90 to 2.00
Connellsville fur. contr.	2.00 to 2.10
Connellsville foundry	2.40 to 2.65
Connellsville fdy., contr.	2.50 to 2.75
Wise county furnace	1.90 to 2.10
Wise county foundry	2.50 to 3.10
Pocahontas furnace	2.00 to 2.40
Pocahontas foundry	2.50 to 2.75
New River, foundry	2.75 to 3.50
New River, furnace	2.50 to 2.75

FERRO-ALLOYS

Ferro-manganese, Baltimore	$38.00 to 40.00
Ferro-silicon, 50 per cent, Pbgh.	71.00 to 73.00
Ferro-silicon, 50 per cent, Phila.	71.00 to 73.00
Ferro-sil., 12 to 13 per cent, Pgh.	22.90
Ferro-sil., 11 to 12 per cent, Pgh.	21.90
Ferro-sil., 10 to 11 per cent, Pgh.	20.90
Ferro-sil., 9 to 10 per cent, Pgh.	19.90
Ferro-carbon titanium, carloads, per lb.	8c to 12½c

SEMI-FINISHED STEEL

Bes. billets, Pbgh. and Yn.	$21.00 to 22.00
Open-hearth bil., Pbgh. and Yn.	21.00 to 22.00
Open-hearth bil., Phila.	23.40 to 24.40
Bes. sheet bars, Pbgh. and Yn.	22.00 to 23.00
Op.-h'rth sh. bars, Pbgh. & Yn.	22.00 to 23.00
Forging billets, Phila.	27.40 to 28.40
Forging billets, Pittsburgh.	25.00 to 26.00
Wire rods, Pittsburgh.	26.00 to 26.50

RAILS AND TRACK MATERIAL

Stand. Bess., rails, Pbgh.	1.25c
Stand. open-hearth rails, Pbgh.	1.34c
Light rails, 8 lbs., Pbgh. or Chi.	1.40c
Lgt. rails, 12 lbs., Pbgh. or Chgo.	1.35c
Lgt. rails, 16 to 20 lb., Pbgh. or Chicago	1.30c
Lgt. rails, 25 to 45 lbs., Pbgh. or Chicago	1.25c
Relaying rails, standard, Chgo.	23.00 to 24.00
Relaying rails, light, Chicago	$21.50 to 22.50
Angle bars, st. sect. Pbgh., base	1.50c
Angle bars, st., sections, Chgo.	1.50c
Spikes, railroad, Pbgh.	1.45c to 1.50c
Spikes, railroad, Chgo.	1.55c
Track bolts, Pbgh.	2.00c
Track bolts, Chgo.	2.00c

SHAPES, PLATES AND BARS

Structural shapes, Pittsburgh	1.20c
Structural shapes, Chicago	1.38c to 1.43c
Structural shapes, Philadelphia	1.30c to 1.40c
Structural shapes, New York	1.31c to 1.41c
Structural shapes, San Francisco	2.00c to 2.05c
Tank plates, Chicago	1.33c to 1.38c
Tank plates, Pittsburgh	1.15c to 1.20c
Tank plates, Philadelphia	1.30c to 1.40c
Tank plates, New York	1.31c to 1.41c
Bars, soft steel, Pittsburgh	1.20c to 1.25c
Bars, soft steel, Chicago	1.33c to 1.38c
Bars, soft steel, Philadelphia	1.35c to 1.40c
Bars, soft steel, New York	1.36c to 1.41c
Hoops, carloads, Pittsburgh	1.25c to 1.30c

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 pounds, to:—

New York	16 cents
Philadelphia	15 cents
Boston	18 cents
Buffalo	11 cents
Baltimore	14½ cents
Cleveland	10 cents
Cincinnati	15 cents
Chicago	18 cents
Denver	67½ cents
St. Louis	22½ cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast, plates and shapes	80 cents

Hoops, less carloads, Pittsburgh.	1.35c
Bands, Pittsburgh	1.15c to 1.20c
Shafting, carloads, Pbgh., disc.	63 to 65
Shaft'g, less carl'ds, Pbgh., disc	58 to 60
Bar iron, Chicago	1.15c to 1.20c
Bar iron, Philadelphia	1.22½ to 1.32½c
Bar iron, New York	1.25c to 1.30c
Bar iron, Cleveland	1.20c to 1.25c
Bar iron, Pittsburgh	1.30c to 1.35c
Hard steel bars, Chicago	1.30c
Smooth finish'g mchy. steel, Chi.	1.68c

SHEETS AND TIN PLATE

No. 28, black, Pittsburgh	1.95c to 2.00c
No. 28, black, Chicago	2.13c to 2.18c
No. 28, tin mill, black, Pbgh.	1.90c to 1.95c
No. 28, galvanized, Pbgh.	2.95c to 3.00c
No. 28, galvanized, Chgo.	3.13c to 3.18c
No. 28, cor. galv., Pbgh.	3.05c to 3.10c
No. 28, painted cor., Pbgh.	2.15c to 2.20c
No. 10, blue annealed, Pbgh.	1.40c to 1.45c
No. 10, blue annealed, Phila.	1.55c to 1.60c
Tin plate, 100 lb., coke, base	$3.40

IRON AND STEEL PIPE

(Pittsburgh.)

	Black Butt-weld.	Galv. Butt-weld.
Steel, ⅛ to 3 inches	79½	71
Iron, ⅛ to 2½ inches	70	61
	Lap-weld.	
Steel, 2½ to 6 inches	79	70½

BOILER TUBES

Steel, 3½ to 4½ inches	71
Iron, 3½ to 4½ inches	60

WIRE PRODUCTS

Wire nails, jobbers, Pittsburgh	$1.60
Wire nails, retailers, Pittsburgh	1.65
Plain wire, jobbers, Pittsburgh	1.40
Plain wire, retailers, Pittsburgh	1.45
Galvanized wire, jobbers, Pbgh.	1.80
Galvanized wire, retailers, Pbgh.	1.85
Polished staples, Pbgh.	1.60
Galvanized staples, Pbgh.	2.00
Barb wire, painted, jobbers, Pbgh.	1.60
Barb wire, painted, retailers, Pbgh.	1.65
Barb wire, galv., retailers, Pbgh.	2.05
Barb wire, galv., jobbers, Pbgh.	2.00

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller and shorter, rolled threads, 80 and 2½; cut threads, 75 and 17½; larger and longer, 70 and 15.

Machine bolts and hot pressed nuts ⅜ x 4 inches, smaller and shorter, rolled, 80 and 7½; cut, 80 and 2½; larger and longer, 70, 10 and 10.

Gimlet and cone point lag or coach screws, 80 and 20.

Hot pressed square, blank and tapped nuts, $6.00 off list; hot pressed hexagon blank or tapped, $6.70.

Cold pressed, C. & T. square, blank, or tapped, $3.80 off; hexagon, blank or tapped, ⅝ inch and larger, $6.80; ½-inch and smaller, $7.40.

RIVETS

Structural rivets, Pbgh.	1.60c to 1.65c
Structural rivets, Chgo.	1.78c
Boiler rivets, Pbgh.	1.70c to 1.75c
Boiler rivets, Chgo.	1.88c

SCREWS

(New York.)

Lag, gimlet and cone point	80 and 20
Coach, gimlet point	80
Standard jack	70 and 10
Mch., cut thread, flat head	50 and 10
Mach., cut thread, round head	50 and 10 and 10
Mch., cut thread, fillister hd.	40 and 40 and 10
Mch., rolled thread, flat head or round head	80 and 10
Set screws, iron	75 and 10 and 10
Set screws, steel, per cent advance over iron	25
Square head cap screws	70 and 10 and 10
Hexagon head cap screws	70 and 10 and 10
Fillister head cap screws	60 and 10 and 10
Flat head wood screws	10 and 10 and 5
Round head wood screws	10 and 10 and 5

WASHERS

(Iron or steel, New York.)

⅛-inch	5.90c
⅜-inch	5.00c
½-inch	3.90c
⅝-inch	3.70c
¾-inch	3.60c

STEEL SHEET PILING

(Pittsburgh.)

Base sizes	1.55c to 1.60c

TWISTED REINFORCING BARS

(Soft steel, Pittsburgh mill.)

¼-inch and larger	1.25c
⅜-inch	1.30c
½-inch	1.35c
⅝-inch	1.50c
¼-inch	1.75c

IRON AND STEEL PRICES

Corrected up to Tuesday noon

TACKS

(New York.)

	Discount.
American carpet tacks	90 and 20 and 10
American cut tacks	90 and 20 and 10
Railroad tacks	90 and 40
Gimp tacks	90 and 20 and 10
Finishing nails	70

WIRE ROPE

Galvanized, iron and steel	47½ and 2½
Bright, iron and steel	55 and 2½

TRIANGLE REINFORCING MESH

(Per 100 square feet f. o. b. mill, car loads.)

No. 4, plain	$1.00
No. 4, galvanized	1.12
No. 7, plain	.49
No. 7, galvanized	.55
No. 23, plain	1.69
No. 23, galvanized	1.88
No. 26, plain	1.17
No. 26, galvanized	1.30
No. 27, plain	.96
No. 27, galvanized	1.07
No. 31, plain	2.49
No. 31, galvanized	2.76
No. 35, plain	1.17c
No. 35, galvanized	1.30
No. 39, plain	3.05
No. 39, galvanized	3.38
No. 43, plain	1.10
No. 43, galvanized	1.23

SPIRAL RIVETED PIPE

(Per 100 linear feet, f. o. b. factory.)

4-inch, plain	$ 19.76
4-inch, galvanized	30.74
6-inch, plain	33.05
6-inch, galvanized	49.73
8-inch, plain	43.17
8-inch, galvanized	65.00
10-inch, plain	66.42
10-inch, galvanized	96.15
12-inch, plain	83.75
12-inch, galvanized	118.30
14-inch, plain	99.14
14-inch, galvanized	138.85
16-inch, plain	117.53
16-inch, galvanized	166.58
20-inch, plain	183.79
20-inch, galvanized	248.39
24-inch, plain	219.92
24-inch, galvanized	293.99
30-inch, plain	324.81
30-inch, galvanized	430.64

CAST IRON PIPE

Three to 24 in., Cleveland	$22.35 to 22.80
Four-inch, water, Chicago	26.50
Six to 12 inches, Chicago	24.50
Larger sizes, Chicago	24.00
Six inch, water, New York	22.00 to 23.00
Four-inch, water, Birmingham	21.50
Six inch and larger, Birmingham	19.50

Gas pipe, $1 per ton higher than water.

WAREHOUSE PRICES

Steel bars, Chicago	1.65c
Steel bars, Cleveland	1.80c
Steel bars, Cincinnati	1.75c to 1.90c
Steel bars, Philadelphia	1.75c to 1.80c
Steel bars, New York	1.90c
Iron bars, Chicago	1.65c
Iron bars, Cleveland	1.75c
Iron bars, Cincinnati	1.70c to 1.80c
Iron bars, Philadelphia	1.65c to 1.70c
Hoops, Chicago	2.15c
Shapes and plates, Chicago	1.75c
Shapes and plates, Cleveland	1.90c
Shapes and plates, Cincinnati	1.85c to 1.90c
Shapes and plates, Philadelphia	1.75c to 1.80c
Shapes and plates, New York	1.95c
No. 10 blue ann. sheets, Chgo.	1.95c
No. 10 blue ann. sheets, Cleve.	2.15c
No. 10 blue ann. sheets, Cinci.	2.00c to 2.05c
No. 28 black sheets, Chgo.	2.55c
No. 28 black sheets, Cleveland.	2.60c
No. 28 black sheets, Cincinnati.	2.45c to 2.55c
No. 28 galv. sheets, Chgo.	3.60c
No. 28 galv. sheets, Cleveland.	3.60c
No. 28 galv. sheets, Cincinnati.	3.45c to 3.55c

IRON AND STEEL SCRAP

(Net tons.)

No. 1 railroad wrought, Chgo.	$ 8.50 to 9.00
No. 1 railroad wrought, Cleve.	9.50 to 10.00
No. 1 R. R. wght., eastern Pa.	14.00 to 14.50
No. 1 railroad wrought, St. L.	8.00 to 8.50
No. 1 railroad wrought, Cinci.	8.50 to 9.00
No. 2 railroad wrought, Chgo.	8.00 to 8.50
No. 2 railroad wrought, St. L.	7.75 to 8.25
Arch bars and transoms, Chgo.	12.00 to 12.50
Arch bars and transoms, St. L.	12.00 to 12.50
Knuckles, coup. and spr'gs, Chgo.	9.00 to 9.50
Knuckles, coup., and spg's, St. L.	9.75 to 10.25
Shafting, Chicago	11.50 to 12.00
Shafting, St. Louis	13.00 to 13.50
Steel car axles, Chgo.	12.25 to 12.75
Steel car axles, St. Louis	13.00 to 13.50
Locomotive tires, Chicago	10.00 to 10.50
Locomotive tires, St. Louis	9.00 to 9.50
Cut forge, Chicago	8.00 to 8.50
Pipes and flues, Chicago	6.50 to 7.00
Pipes and flues, Cleveland	8.00 to 8.50
Pipes and flues, St. Louis	6.50 to 7.00
No. 1 cast, Chicago	9.50 to 9.75
No. 1 cast, New Jersey points	12.50 to 12.75

Freight Rates, Coke

Connellsville regions, per 2,000 lbs., to:—

Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.70
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley furnaces	1.20
Cincinnati	2.00

No. 1 cast, Cleveland	10.75 to 11.00
No. 1 cast, Cincinnati	10.00 to 10.50
No. 1 cast, St. Louis	10.00 to 10.50
No. 1 busheling, Chicago	7.25 to 7.75
No. 1 busheling, Cleveland	8.50 to 9.00
No. 1 busheling, Cincinnati	6.25 to 6.75
No. 1 busheling, St. Louis	7.50 to 8.00
No. 2 busheling, Chicago	5.75 to 6.25
No. 1 boiler plate, cut, Chgo.	6.50 to 7.00
No. 1 boiler plate, cut, Buffalo	9.00 to 9.50
No. 1 boiler plate, cut, St. L.	6.00 to 6.50
Boiler punchings, Chicago	9.75 to 10.25
Cast borings, Chicago	4.25 to 4.75
Cast borings, Cleveland	5.50 to 6.00
Cast borings, Cincinnati	4.25 to 4.75
Cast borings, St. Louis	4.00 to 4.50
Machine shop turnings, Chgo.	4.75 to 5.25
Machine shop turnings, Cleve.	5.00 to 5.50
Machine shop turnings, Cinci.	4.50 to 5.00
Machine shop turnings, St. L.	4.50 to 5.00
Malleable, agricultural, Chgo.	8.50 to 9.00
Malleable, agricultural, St. Louis	7.50 to 8.00
Malleable, railroad, Chicago	9.75 to 10.25
Malleable, railroad, Cincinnati	6.50 to 7.00
Malleable, railroad, St. Louis	8.00 to 8.50
Angle bars, iron, Chgo.	11.75 to 12.25
Angle bars, iron, St. Louis	10.00 to 10.50
Angle bars, steel, Chgo.	8.25 to 8.75
Angle bars, steel, St. Louis	9.00 to 9.50
Stove plate, Chicago	9.00 to 9.50
Stove plate, Cleveland	8.25 to 8.75
Stove plate, Buffalo	9.75 to 10.00
Stove plate, Cincinnati	7.00 to 7.50
Stove plate, St. Louis	7.50 to 8.00
Bundled sheet, Cincinnati	4.75 to 5.25
Wrought iron pil'g plates, Clev.	13.00

(Gross Tons.)

Heavy melting steel, Pbgh	$12.00
Heavy melting steel, Buffalo	10.00 to 10.50
Heavy melting steel, Chicago	9.25 to 9.75
Heavy melting steel, Cleveland	10.00 to 10.75
Heavy melting steel, Cincinnati	9.00 to 9.50
H'vy melting steel, eastern Pa.	11.00
Heavy melting steel, New York	8.50 to 9.00
Heavy melting steel, St. Louis	11.00 to 11.50
Bundled sheet, Buffalo	6.25 to 6.50
Grate bars, Buffalo	9.50 to 10.00
No. 1 railroad wr'ght, east. Pa.	13.00 to 13.50
No. 1 R. R. wght., New York	11.00 to 11.50
No. 1 R. R. wrought, Buffalo	11.00 to 11.50
Shafting, New York	12.50 to 12.75
Pipes and flues, New York	8.00 to 8.25
Pipes and flues, eastern Pa.	10.50 to 11.00
Mch. shop turnings, New York	6.00 to 6.25
Machine shop turnings, Buffalo	5.50 to 6.00
Mach. shop turn'gs, eastern Pa.	8.00 to 8.50
Cast borings, New York	5.50 to 5.75
Cast borings, eastern Pa.	8.50 to 9.00
Cast borings, Buffalo	6.00 to 6.50
Cast borings, Pittsburgh	8.25 to 8.50
Stove plate, New York	7.50 to 7.75
Stove plate, Pittsburgh	9.50 to 9.75
Grate bars, New York	7.25 to 7.50
Shoveling steel, Chicago	9.00 to 9.50
Shoveling steel, St. Louis	9.00 to 9.50
Reroll'g rails, 5 ft. and ov., Pbgh.	13.50 to 14.00
Reroll. rails, 5 ft. and ov., Chgo.	11.25 to 11.75
Reroll. rails, 5 ft. and ov., Cleve.	11.75 to 12.25
Rerolling rails, 5 ft. and over, eastern Pa.	13.00 to 13.25
Reroll. rails, 5 ft. and ov., St. L.	12.00 to 12.50
Steel rails, short, Chicago	10.00 to 10.50
Steel rails, short, Cleveland	13.00 to 13.50
Steel rails, short, eastern Pa.	11.00 to 11.25
Steel rails, short, St. Louis	11.50 to 12.00
Iron rails, Cleveland	13.50 to 14.00
Iron rails, Cincinnati	10.50 to 11.00
Iron rails, eastern Pa.	15.00 to 16.00
Iron rails, St. Louis	12.00 to 12.25
Frogs, switches, guards, Chgo.	9.25 to 9.75
Frogs, switches and g'rds, St. L.	11.00 to 11.50
Car wheels, (iron), Pittsburgh	12.50 to 13.00
Car wheels (steel) Pittsburgh	13.50 to 14.00
Car wheels, Chicago	11.00 to 11.50
Car wheels, eastern Pa.	12.00 to 12.50
Car wheels, Buffalo	12.00 to 12.50
Car wheels, N. J. points	12.50 to 12.75
Car wheels, St. Louis	11.25 to 11.75
Iron axles, Pittsburgh	22.50 to 23.00
Iron axles, Cincinnati	19.00 to 20.00
Iron axles, eastern Pa.	20.00 to 21.00
Iron axles, Buffalo	21.50 to 22.00
Iron axles, Chicago	16.50 to 17.00
Steel car axles, New York	13.25 to 13.50
Steel car axles, Buffalo	15.00 to 15.50
Steel car axles, Cleveland	16.50 to 17.00
Steel car axles, eastern Pa.	15.25 to 15.75
No. 1 busheling, Buffalo	8.50 to 9.00
No. 2 busheling, Buffalo	6.00 to 6.50
Low phosphorus steel, Buffalo	15.00 to 15.50
Low phosphorus steel, Pbgh.	14.25 to 14.50
Low phos. steel, eastern Pa.	14.50 to 15.00
Malleable R. R. Buffalo	10.75 to 11.25
No. 1 forge, eastern Pa.	9.00 to 9.50
Pipes and flues, Eastern Pa.	10.50 to 11.00
No. 1 cast eastern Pa.	13.00 to 13.50
Bundled sheet, Cleveland	6.50 to 7.00
Boiler plate, Cleveland	7.50 to 8.00
Mal., R. R. east. Pa.	9.00 to 9.50
Mall. iron, agricul., Cleveland	9.00 to 9.50
Mall. iron R. R., Cleveland	10.50 to 11.00
Malleable, railroad, Pittsburgh	10.00 to 10.25
No. 1 railroad wrought, Pbgh.	12.50 to 12.75
No. 1 cast, Pittsburgh	12.00 to 12.25
No. 1 busheling, Pittsburgh	10.00 to 10.25
Mch. shop turnings, Pbgh.	8.00 to 8.25
Bundled sheet, Pittsburgh	8.50 to 8.75
Stove plate, eastern Pa.	9.00 to 9.50

MISCELLANEOUS SHOP TOOLS

	Discount.
Standard files	80 and 5
Heavy hammers, 3 to 5 lb.	80 and 10
Heavy hammers, over 5 lb.	80 and 5
Gas pliers, 7-inch, per dozen	$2.00
Gas pliers, 12-inch, per dozen	3.50
Cold chisels, per pound	13c to 15c
Wrenches, Alligator, discount	75 and 80
Wrenches, drop forged S.	50 and 10

Gray Iron and Semi Steel
CASTINGS
either machined or rough
Our facilities for giving you service are exceptional. From start to finish our foundry is right up to the minute in every respect. Our daily capacity is **25 tons.**
We also specialize all kinds of
Intricate Molding and Chilled Castings
and will be pleased to furnish estimates.
Write us
PHOENIX MANUFACTURING CO.
EAU CLAIRE, WIS.

TISCO MANGANESE STEEL CASTINGS
FOR SEVERE SERVICE
Taylor-Wharton Iron & Steel Co.
High Bridge, New Jersey

Gray Iron
CASTINGS
UP TO 10 TONS
Our facilities are EXCEPTIONAL—a FOUNDRY 160 x 80 ft.; a GENERAL MACHINE SHOP 400 x 80 ft., in which we can turn out work up to 16 ft. in dia.; and a large PATTERN SHOP complete in every detail.
The Adamson Machine Co.
AKRON, OHIO

Woodmansee & Davidson, Inc.
ENGINEERS
All Kinds of Power Plants
SPECIALISTS in the Industrial Application of PRODUCER GAS
MILWAUKEE, Wells Bldg. CHICAGO, 1st National Bank

Exceptional Service!
With a daily capacity of **twenty tons**; with equipment modern in every feature; with a location ideal for shipping purposes, we are prepared to make castings of any size up to 15 tons, giving you exceptional service.
GREY IRON and SEMI STEEL
CASTINGS
No matter how difficult your requirements may be, we guarantee you service and satisfaction.
Let us figure on your next specifications.
The Columbus Machine & Tool Co.
COLUMBUS, OHIO

Technical Reports

(*Continued from page* 680.)

be attractive, and the table of contents should be very full. The report proper opens with a statement of the object and scope of the report, the general method of attack, and of obligations incurred in the preparation as to sources of material, etc. The body of the report is usually divided into sections, which are treated as separate units, with a summary after each, and a complete summary after the last one. Diagrams are advisable wherever possible, and at the conclusion, an appendix is placed, which contains all original material, results of analyses, photographs, personal letters, copies of newspaper clippings, etc., and a bibliography of the literature of the subject."

Forthcoming Meetings

American Foundrymen's Association.—A. O. Backert, secretary, Penton building, Cleveland. Convention Sept. 7-10, La Salle hotel, Chicago.

American Hardware Manufacturers' Association.—F. D. Mitchell, secretary, 1510 Woolworth building, New York. Next meeting to be held jointly with Southern Hardware Jobbers' Association at White Sulphur Springs, West Va., June 9-11.

American Institute of Electrical Engineers.—F. L. Hutchinson, secretary, 33 West Thirty-ninth street, New York. Next meeting at Detroit, June 23-26.

American Institute of Mining Engineers.—Bradley Stoughton, secretary; Albert Sauveur, chairman of Iron and Steel Committee, 29 West Thirty-ninth street, New York. Next meeting in Salt Lake City, Aug. 10-14.

American Iron and Steel Institute.—James T. McCleary, secretary, 30 Church street, New York. Next meeting, May 22 and 23, 1914, at New York.

American Society for Testing Materials.—Prof. E. Marburg, secretary, University of Pennsylvania, Philadelphia. Next meeting, June 30 to July 4, at Hotel Traymore, Atlantic City, N. J.

American Society of Civil Engineers.—C. W. Hunt, secretary, 220 West Fifty-seventh street, New York. Regular meetings at New York, first and third Wednesday of each month, except June and August.

American Society of Mechanical Engineers.—Calvin W. Rice, secretary, 29 West Thirty-ninth street, New York. Next meeting, June 16-19, at University of Minnesota, Minneapolis.

American Railway Engineering Association.—E. A. Fritch, secretary, 900 South Michigan avenue, Chicago. Next meeting in March, 1915, at Chicago.

Chicago Foundrymen's Club.—C. E. Hoyt, secretary, Lewis Institute, Chicago. Regular meetings at Sherman hotel, on second Saturday of each month.

Engineers' Society of Western Pennsylvania.—Elmer K. Hiles, secretary, Oliver building, Pittsburgh. Regular meetings, third Tuesday of each month.

Lake Superior Mining Institute.—A. J. Yungbluth, secretary, Ishpeming, Mich. Next meeting on Marquette range, in August, 1914.

National Founders' Association.—W. H. Barr, president. Lumen Bearing Co., Buffalo; J. M. Taylor, secretary, Chicago; A. E. McClintock, commissioner, Chicago. Next meeting in New York, in November, 1914.

National Metal Trades Association.—J. D. Hibbard, commissioner, Chicago. Next meeting at Worcester, Mass., April 21-22.

New England Foundrymen's Association.—Fred F. Stockwell, secretary, 205 Broadway, Cambridgeport, Mass. Regular meetings, second Wednesday of each month, at Exchange Club, Boston.

Philadelphia Foundrymen's Association.—Howard Evans, secretary, Pier 45 North, Philadelphia. Regular meetings, first Wednesday of each month, at Manufacturers' Club.

Superintendents' and Foremen's Club of Cleveland.—Philip Frankel, secretary, 310 New England building, Cleveland. Regular meetings, third Saturday of each month.

Western Society of Engineers.—J. H. Warden, secretary, 1785 Monadnock building, Chicago. Regular meetings, first Wednesday of each month, except July and August, in Monadnock building.

Coal Briquettes Worth Money

Coal briquettes to the amount of 181,859 short tons, valued at the plants at $1,007,327, were manufactured in 1913, according to Edward W. Parker, of the United States Geological Survey. The figures for 1913 show a decrease of 17 per cent in the tonnage of briquettes manufactured, but an increase of over 5½ per cent in value over the figures for 1912. Seventeen briquetting plants were in operation during the year, eight in the eastern states, five in the central states, and four on the Pacific coast. Seven of these plants used anthracite culm or "fines", five used bituminous or semi-bituminous coal, two used carbon residue from oil-gas works, and the others used mixed coals. Coal-tar pitch is the principal binder employed, eight plants using it. Patented binders were used at five plants.

A Domestic Fuel

If the future of this infant relative of the coal-mining industry is to be judged by the record of 1913, the judgment should be based on the increase in value rather than on the decrease in plants and in tonnage. Briquetted fuel in the United States is essentially a domestic fuel, for which there was a slackened demand in 1913, owing to the exceptional mildness of the winter of 1912-13, and of last November and December. In consequence the consumption of briquettes for domestic purposes, like that of raw fuel, was generally less throughout the United States in 1913 than in either 1911 or 1912. An exception to this decrease is to be noted on the Pacific coast, where the number of operating plants increased from three to four, and the production in 1913 was exactly double that of 1912, with a gain in value of somewhat larger proportion.

Mr. Parker believes that the briquette as a domestic fuel is bound to increase in popular demand as its good qualities come into more general notice. The briquettes which appear to meet with greatest favor in the eastern states are of the boulet type, egg or pillow shaped and about the size of anthracite nut. The briquettes that are practically smokeless, as they should be, make an ideal fuel for the open grate or kitchen range, holding their shape until entirely consumed and then falling, when stirred, into a pulverulent, clinkerless ash. In the Central and Pacific coast states the popular type of briquetted fuel appears to be the larger size, about that of egg coal, for which the raw materials available seem to be best adapted.

Feed Water Difficulties

The problem of suitable feed water, although less serious in New England than in other parts of the country, is still a trouble maker in many plants. The formation of scale and the softening of water are due to simple chemical reactions, and by an analysis of the water a competent chemist can readily predict in advance the proper amounts of suitable chemicals necessary to prevent scale or corrosion, and not only save the expense of frequent boring and replacing of tubes, but obviate the necessity of attempting to force heat through the same substance with which many steam lines are insulated. "The services of a chemist," said Carl F. Woods, secretary of the firm of Arthur D. Little, Inc., of Boston, when recently speaking before a group of street railway operators, "would prevent the purchase of a special compound at $1,000 a year, which consisted of 97 per cent water and 3 per cent molasses, or obviate the necessity of purchasing a mixture of soda ash, tannin and water under a brand name at 8 cents a pound when the principal ingredient can be obtained for 1 cent a pound."

"Heavy Duty" Shaper Manufacturers

To the Steel Barons

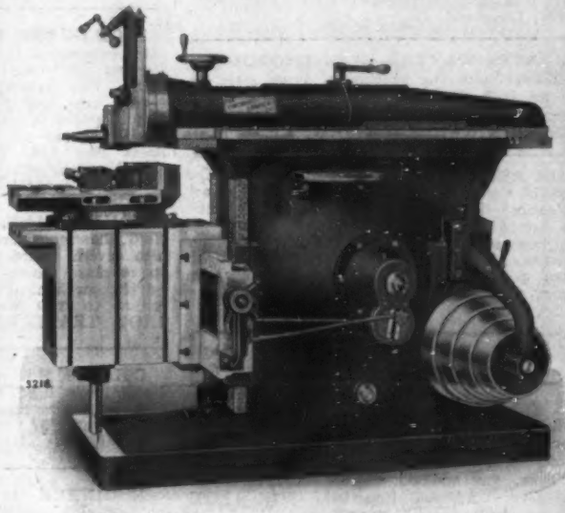
Some users of Cincinnati 32" Heavy Duty Shapers:

Standard Steel Car Co., New Castle, Pa.
Pittsburgh Steel Co., Monessen, Pa.
Oil Well Supply Co., Pittsburgh, Pa.
Standard Sanitary Mfg. Co., New Brighton, Pa.
Alloy Steel Forging Co., Pittsburgh, Pa.
National Tube Co., McKeesport, Pa.
Pressed Steel Car Co., Pittsburgh, Pa.
McKeesport Tin Plate Co., McKeesport, Pa.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
Pittsburgh Steel Foundry Co., Glassport, Pa.
Republic Iron & Steel Co., Youngstown, Ohio
Allegheny Steel Co., Brackenridge, Pa.
Wheeling Corrugating Co., Wheeling, W. Va.
A. Garrison Foundry Co., Pittsburgh, Pa.

The above are all big concerns in the Pittsburgh district which carefully investigated and then bought the best.

They had real reasons for investing in "CINCINNATI" Heavy-Duty Shapers—*so have you.*

Catalog "G" will help you to decide for your best interests.



The Cincinnati Shaper Co.
CINCINNATI, OHIO

Opportunities

Men Wanted
Minimum, 50 words, $1.00. Each additional word, 2c. All capitals, 50 words, $1.50. Each additional word, 3c.

Position Wanted
Minimum, 25 words, 50c. Each additional word, 2c. All capitals, 25 words, 75c. Each additional word, 3c.

Miscellaneous Classified
Minimum, 25 words, $1.00. Each additional word, 4c. All capitals, 25 words, $2.00. Each additional word, 8c.

Men Wanted

ENGINEERS, SUPERINTENDENTS, foremen. Designers and Executive Office Men wanted; also cost accountants and experienced engineering salesmen. State fully experience in first letter. The Engineering Agency, Inc., 20th year, Chicago.

WANTED — FOREMAN FOR DRAW bench work, man experienced in special shapes, tubing and conversant with all the requirements in the process of manufacturing doors, windows and metal trim. Address Box 38, Youngstown, O.

WANTED — SUPERINTENDENT, BY old established, medium sized stove foundry, located in the middle west. A young man of experience in stove making, energetic, temperate and capable of handling men is desired. Address Bergstrom Stove Co., Neenah, Wis.

WANTED—FIRST CLASS GENERAL foreman to take complete charge of foundry manufacturing cast iron water pipe. State experience, references and wages. Address Box 123, THE IRON TRADE REVIEW, Cleveland, O.

WANTED: — COST ACCOUNTANT. Active and energetic young man for manufacturing plant, operating foundry and machine shop. Knowledge of storekeeping, time keeping, setting piece work rates, and routing very large quantities of duplicate parts essential. Must have executive ability, and be able to use diplomacy in handling men. State age, experience, salary desired and references. Address Box 131, THE IRON TRADE REVIEW, Cleveland, O.

HEATER WANTED—MAN THOROUGH-ly familiar with the heating of large sizes of wrought iron suitable for chain. State experience and wages expected. Address Box 129, THE IRON TRADE REVIEW, Cleveland.

THE BEST WAY TO GET A GOOD PO-sition in drafting or engineering is to file an application direct with some of our clients who are depending on us to get competent and experienced applicants for their vacant positions. Send stamp for blank and list of vacant positions. The Cleveland Engineering Agency Co., Rose building, Cleveland, O.

Positions Wanted

AS FOREMAN OF PATTERN SHOP. Over 12 years as foreman employing from 20 to 100 men. Broad experience with molding machines, gas and oil engines, and electrical machinery. Address Box 987, THE IRON TRADE REVIEW, Cleveland, O.

EXECUTIVE POSITION DESIRED: — Practical mechanic, 14 years foreman, good draftsman, extensive experience in foundry practice and pattern work, wood or metal and general shop practice. Address Box 113, THE IRON TRADE REVIEW, Cleveland, O.

WANTED — POSITION BY FIRST class rivet, screw and bolt operator; have had 16 years experience; have been foreman six years; can give good references. Address Box 105, THE IRON TRADE REVIEW, Cleveland, O.

TRAFFIC MANAGER OF WIDE RAIL-road experience, familiar with iron and steel, purchasing, etc.; desires connection with industrial corporation. Interview requested. Address "Traffic", THE IRON TRADE REVIEW, Cleveland, O.

ROLL TURNER WANTS POSITION IN iron or steel works; experienced; references. Address Box 106, THE IRON TRADE REVIEW, Cleveland, O.

SITUATION WANTED—A COMPETENT man is open for engagement to take charge of boiler-plate or structural shop. Address Boiler Maker, THE IRON TRADE REVIEW, Cleveland, O.

WANTED: — POSITION AS SUPERIN-tendent or foreman by a thoroughly practical and capable man of 20 years experience in erecting iron stairways, railings, store fronts, and general ornamental iron work. Address Box 108, THE IRON TRADE REVIEW, Cleveland, O.

ENGINEER WHO HAS JUST FINISHED designing and superintending the construction of an open hearth plant and blooming mill, wishes to help build another mill. Address Box 114, THE IRON TRADE REVIEW, Cleveland, O.

HIGH-GRADE FOREMAN WITH FIRST-rate experience in foundry practice looking for position with better chance for advancement. Can mix by analysis and guarantee to reduce cost and improve quality of castings. Would prefer a railroad and jobbing shop. I am in charge of a jobbing shop now. Address Box 116, THE IRON TRADE REVIEW, Cleveland, O.

YOUNG MAN, CLEAN CUT, AMBI-tious, has considerable engineering experience also several years sales experience, would like to represent some first-class concern in Pittsburgh, mechanical line preferred. Would be willing to start low. Address Box 115, THE IRON TRADE REVIEW, Cleveland, O.

CHECKER OR DRAFTSMAN, CAN handle any kind of work around steel mill, also light structural work; eight years' experience; age 32, married. Address Box 130, THE IRON TRADE REVIEW, Cleveland.

ENGINEER, 33 YEARS OLD, TECHNI-cal training, specialist in combustion, metallurgical and works technology, seeks position as engineering salesman, representative or branch manager. Twelve years experience iron and steel business in operating, producing and commercial departments. Now holding responsible position with large steel industry. Address Box 121, THE IRON TRADE REVIEW, Cleveland, O.

POSITION WANTED—BLAST FURNACE AND STEEL MILL. MASTER MECHANIC WILL BE OPEN FOR ENGAGEMENT MAY 1. WIDE EXPERIENCE WITH STEAM AND ELECTRIC POWER EQUIPMENTS, CONSTRUCTION AND OPERATION. ADDRESS BOX 132, THE IRON TRADE REVIEW, CLEVELAND, O.

Sales Agents

WANTED — ACCOUNT FOR MIDDLE WEST STATES. MANUFACTURING TRADE. ACT AS DIRECT REPRESENTATIVE. COMMISSION BASIS. HAVE CHICAGO OFFICE. 12 YEARS SELLING EXPERIENCE. BEST OF REFERENCES. ADDRESS BOX 125, THE IRON TRADE REVIEW, CLEVELAND, O.

AGENTS WANTED IN NEW ENGLAND cities to sell concrete reinforcing steel bars, from Boston stock. Commission basis. Address Box 133, THE IRON TRADE REVIEW, Cleveland, O.

For Sale

WELL EQUIPPED SILICA SAND MILL. About 20 acres, 60-foot face highest grade rock. Mrs. M. Arnold, Canal Dover, O.

FOR SALE—170 ACRE COUNTRY ES-tate on Lake Erie, 2,250 feet of lake front, on car line; gas well, water system, electric lights, unusually well equipped farm; fine buildings and soil; stock, tools and crops go with property. Harry R. Scobie, 405 Swetland building, Cleveland, O.

FOR SALE — GENERAL MACHINE shop in City of 75,000. Last year's business amounted to nearly $20,000. Excellent investment for one familiar with the machinist trade. Can be bought for $8,000, worth $10,000. Good reasons for selling. Terms. If interested, write at once. WIEDERHOLD REALTY CO., No. 214 Germania Ave., Saginaw, Michigan.

Miscellaneous

PROGRESSIVE ENGINEERING CON-cern to build and market, on a royalty basis, a stoker suitable for boilers, iron and steel heating furnaces, adaptable to locomotives. Correct in principle and mechanical details. Complies with all requirements for smokeless combustion. Address Box 122, THE IRON TRADE REVIEW, Cleveland, O.